

State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	OOSTERDAM	Date:	June 7, 2008
Vessel Operator:	Holland America Line	Entry Time:	9:30 AM
Vessel Type	Passenger Ship	Exit Time:	12:10 PM
Location:	Pier 30, Seattle	Notification (name & date):	Jon Turvey, Bill Morani; June 2, 2008
On-board contact(s):	Ted Arnold, Environmental Officer, Bob Diaz, HAL Office – Deputy Director, Environmental Compliance, Sergij Wladimirov, 3 rd Enginner/AWWPS Operator		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	1848/800		

The OOSTERDAM arrived on April 29th, 2008 at the Port of Seattle to begin the 2008 cruise season. The Rochem graywater system was not functioning at the time of the inspection. The majority of the graywater is held and then discharged outside of MOU waters. The rest of the graywater is sent to the blackwater system to dilute the concentrated blackwater influent. The blackwater system is functioning, but all discharges are being held and then discharged outside of MOU waters.

Section B: Areas Evaluated

<input checked="" type="checkbox"/>	Black/Gray wastewater system	<input checked="" type="checkbox"/>	Residual solids	<input checked="" type="checkbox"/>	Records/Reports	<input checked="" type="checkbox"/>	Hazardous Waste/Solid Waste	<input type="checkbox"/>	Sampling/Monitoring
<input checked="" type="checkbox"/>	Discharge locations	<input checked="" type="checkbox"/>	Operations & Maintenance	<input checked="" type="checkbox"/>	Sludge Handling/Disposal	<input checked="" type="checkbox"/>	Oily bilge water	<input checked="" type="checkbox"/>	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	Not Applicable
<input type="checkbox"/>	Operations as described in submitted documentation	Not Applicable
<input checked="" type="checkbox"/>	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	Not yet required, but they do have continuous monitoring for turbidity.
<input checked="" type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Not required, but their continuous turbidity monitoring equipment appears to be functioning properly.
	<u>Turbidity or equivalent</u> : Not yet required, but they do have continuous turbidity monitoring. Last calibration – as needed. Trigger level for early alarm: 10 fnu Trigger level for shutdown: 20 fnu Recorded turbidity/equivalent levels above triggers:	
<input checked="" type="checkbox"/>	Auto shut down or operational controls to insure system shut down if high turbidity occurs	Not required, but they do have continuous monitoring for turbidity which automatically shuts down the discharge at 20 fnu.
<input checked="" type="checkbox"/>	Disinfection system operated and maintained properly	The disinfection system appears to be maintained and operating properly.
	Disinfection System: There is one ultraviolet (UV) disinfection system for the blackwater system, and one UV system for the graywater system. Each UV unit has eight light bulbs with a lighted alarm at the unit if a bulb is out.	

Section D: For vessels discharging continuously [2.1.3(B)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	Not Applicable
<input type="checkbox"/>	Operations as described in submitted documentation	Not Applicable
<input type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring	Not Applicable

<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable
	Turbidity or equivalent : Last calibration Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	Not Applicable
<input type="checkbox"/>	Disinfection immediately prior to discharge	Not Applicable
<input type="checkbox"/>	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section E: General (Approved to Discharge)

<input checked="" type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tye Shoal)	No discharges are currently occurring within Waters subject to the MOU. They do have protocols in place and maps depicting the shellfish areas within ½ mile of the shipping lanes.
<input checked="" type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	No discharges are currently occurring within Waters subject to the MOU. They do have their systems set up to automatically shut down the discharge if high turbidity occurs.
<input checked="" type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	No discharges are currently occurring within Waters subject to the MOU. They do have the appropriate notifications numbers posted and available.
<input checked="" type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted, although not necessary as not approved to or discharging in Waters subject to the MOU.
<input checked="" type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Not required at this time.
<input checked="" type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols are being put in place.
<input checked="" type="checkbox"/>	Immediate notifications to Health for GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. They do have protocols in place for notifications.

Section F: General

<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the time of the last inspection (August 25, 2007) to present.
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Residual solids are either incinerated or held to be discharged at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.

Other:

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program conducted the inspection of the Holland America Line OOSTERDAM on June 7, 2008. The main contacts on board the OOSTERDAM included Ted Arnold, Environmental Officer, Sergij Wladimirov, 3rd Engineer and AWWPS Operator, and Robert Diaz, Deputy Director, Environmental Compliance HAL. Prior notification of the visit was given on June 2, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. The OOSTERDAM is currently not approved for and is not discharging black or graywater into MOU waters. The vessel has requested and received approval for discharge at greater than one nautical mile from shore and at greater than six knots in 2004, 2005, and 2006. Discharge approval has not been requested as of yet for the 2008 season. Discharges are being held until outside MOU waters.

The HOLLAND OOSTERDAM was built in 2002, and is 936 feet long with a width of 106 feet and a maximum draft of 26 feet. There passenger capacity is 1848 and the crew capacity is 800. The ship's wastewater systems', Rochem, were installed in 2002. The vessel is powered with on-shore power during port calls in Seattle.

Inspection

I arrived and boarded the ship (photo #01) at about 9:30 am and began with introductions and a plan for the day with the Ted Arnold, the Environmental Officer and Bob Diaz with Holland America Line. We then discussed various waste streams, and the discharge protocols. Discharge records were reviewed for blackwater and graywater discharges; and later for hazardous waste off-loads. We then viewed and discussed the black water treatment system. Next, we toured the garbage sorting area and hazardous waste storage. We then headed to the bridge to review discharge procedures and to verify locations of certain discharges. The inspection was then finalized and I disembarked the vessel at about 12:10 pm.

Discharge Types and Protocols:

All discharges to water occur at greater than 12 nautical miles and outside of MOU waters. No discharges occur in the Olympic Coast National Marine Sanctuary. Only upon verification of location between the Bridge and the Engine Control Room (ECR), will a discharge occur at greater than 12 nautical miles and outside of MOU waters. The maps on the bridge clearly showed that no discharges are to occur in the Olympic Coast National Marine Sanctuary and included a map of "Waters Subject to this MOU". A list of notification numbers in the event of a spill or release in Washington waters includes all required phone numbers per the MOU (Ecology's regional office and Department of Health), as well as other contacts (photo #22). Notifications numbers for oil releases were also posted. If a discharge is allowed, the Bridge authorizes any discharge. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. There is an overboard valve monitoring system on the bridge. The system has four lights:

- >12 nm
- > 4, <12 nm
- <4 nm
- Special Areas

The "special areas light" means no discharges (lit during inspection). The computer system "Overboard Valve Monitoring" system details where certain discharges can and cannot take place and includes alarms. When any overboard valve is open, the location (lat and long) is automatically recorded (open and close). The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, volumes, and speed. Discharges are tentatively scheduled ahead of time by matrix, but locations are always verified prior to discharges. All discharge records that were reviewed appeared to be in compliance with the MOU. A few locations were plotted at the Bridge for verification of location (outside of MOU waters). Some copies were requested and provided for later verification of location. All locations were outside of the MOU waters.

Blackwater, which includes toilet waste, Galley waste, infirmary drains and crew waste, and some graywater for dilution, is treated with a Rochem membrane bioreactor and ultrafiltration system and is then discharged outside of MOU waters. The graywater system, Rochem low pressure reverse osmosis system, is currently not operational and therefore graywater is collected, held and discharged outside of MOU waters.

Screenings and grit from the blackwater system are collected and incinerated. The solids separated out from the blackwater system at the SWECO filter and from the bioreactors, known by the cruise lines as "biomass", is collected into a tank and discharged outside of MOU waters, >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool and spa water is discharged outside of MOU waters.

Food waste is collected in various locations including the galley and the garbage sorting area (photo #21), and is sent to the press. The solid food waste is heated (by steam engine), dried and incinerated. The liquid food waste is sent to the graywater system. Grease is collected separately and off-loaded to shore, often in Seattle for biodiesel use.

Oily bilge water is sent to the 50 ppm oily water separator, then to the intermediate tank and then to the 15 ppm oily water separator. If the effluent does not meet 15ppm, it is automatically sent back for further treatment. The effluent that meets 15 ppm is either discharged at greater than 12 nautical miles and outside of MOU waters or is sent to a clean tank and later discharged. All effluent first goes through the white box for monitoring prior to discharge.

Potable water is bunkered now and then, while the rest is produced by desalination. Steam from the boilers heat up the sea water with low pressure evaporation. The condensate is then chlorinated and adjusted for pH prior to distribution. Salt collected from the evaporators is sent back to the sea. Scaling is treated with acid and is then neutralized prior to discharge at sea. Residual chlorine is monitored at the furthest point for a minimum of 0.2 ppm.

Air conditioning condensate is collected and re-used for wash-down.

Laundry water is sent to the graywater system. Eco-Lab products are used for the laundry and cleaning. Dry cleaning currently uses Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste in Victoria. The dry cleaning system will soon be replaced with a banana oil-based product replacing the PERC.

Silver is captured from the photo waste, collected and off-loaded as hazardous waste in Victoria. All hazardous wastes to shore are off-loaded in Victoria.

Medical waste that is not hazardous is collected in white bags and incinerated. Red bags are used for material containing bodily fluids, and along with sharps are collected and sent to shore with hazardous waste.

Plastics, garbage, and other materials are collected and sorted into various color-coded cans (photo #19) and sorted on a sorting table (photo #20). The materials are then condensed and recycled on-shore. The garbage and food-contaminated cardboard is incinerated. Cardboard is collected and off-loaded for recycling (14 pallets had recently been off-loaded). Glass, aluminum, tin, paper, and plastics are all recycled along with other materials. The amount of materials collected and recycled is maximized in order to minimize the amount of materials incinerated or land filled.

Holland America Line is ISO 14001 Certified. Documents posted on the vessel graph the progress made towards waste minimization and energy conservation. The OOSTERDAM is equipped for shore power in Seattle and was connected during the inspection.

There are weekly passenger presentations from the Environmental Officer that details their environmental programs. Welcome packets and materials in the passenger's cabins encourage energy minimization and proper handling of waste materials.

Graywater System:

The graywater system, Rochem low pressure reverse osmosis (LP-RO), was not operational during the inspection. Graywater is being collected held and discharged outside of MOU waters. Holland America Line continues to work with Rochem on trouble-shooting the system.

Blackwater System:

Sergij Wladimirov, 3rd Engineer and AWWPS operator, joined us to describe the blackwater system, Rochem UF; ultrafiltration, and tour the system. Toilet waste, Galley waste, infirmary drains, crew waste and some graywater (a total of about 20 cubic meters per day) goes to a collection tank (photo #09) and then to a buffer tank (photo #02 and photo #03). Fine bubble diffusion adds air into the buffer tank.

From the buffer tank, flow is sent to prefiltration through the SWECO system (photo #11). Screenings are filtered out and sent to incineration. The SWECO system vibrates out the solids to the solids tank (photo #16) where it combines with solids from the bioreactors and is sent to another tank (5S) for holding and discharge outside of MOU waters. The filters are cleaned about once a month by placing them in a cleaning tank. A temporary pump (photo #11) was being used while one of the regular pumps (photo #12) waits for repair. Filtrate from the SWECO (photo #14 and photo #15) is collected to a tank and then sent to the bioreactors.

There are three bioreactor lines. Lines 1 and 2 have four MBR units, and Line 3 has two MBR units (photo #04) for a total of ten. PH is adjusted after prefiltration before Lines 1 and 2. Conductivity is also monitored at this point. The biological activity takes place in the bioreactors. Solids in the bioreactors are returned back to the beginning of the bioreactors to enhance activity. A minimal amount of solids are periodically wasted to the solids tanks. Total Suspended Solids (TSS) are

monitored continuously at the bioreactors. Oxygen levels are also monitored.

From the bioreactors, flow goes through the membranes for ultrafiltration (UF) (photo #05 and photo #17). Turbidity is also monitored continuously after the permeate for line 3 (photo #06) and in the permeate for lines 1 (photo #10) and 2. Effluent or permeate from the UF's are sent to the permeate tanks. All three lines then combine at one ultraviolet light disinfection system (photo #07). The UV system consists of 8 lights and a control board (photo #08) has a lighted alarm if any of the bulbs are out. Intensity or wattage is not monitored with this system. The glass sleeves on the bulbs are wiped with a rag periodically and inspected weekly. Once a year, the full set of bulbs is replaced. Spares are available on board. From the UV, the flow can either go straight overboard, it can be combined with the graywater system effluent, or can go to storage tanks. The blackwater system is currently not discharging in MOU waters.

The membranes are cleaned by forward movement for 45 minutes, back-flushing for 45 minutes and then an air flush which happens automatically. If the flow drops from about 1.6 cubic meters per day, the membranes may be clogging up and a chemical cleaning is done. The chemical cleaning is done about once a month.

A high alarm is set for turbidity reaching 10 FNU (formazin nephelometric unit), and a high high alarm is set at 20 FNU which automatically shuts down any discharge. Occasionally, alarms have been triggered when there are air bubbles in the sensors. Calibration of the turbidity meters is not required per the manufacturer.

A maintenance program, AMOS, triggers maintenance required such as oiling and greasing motors. Spare blowers, motors, membranes, screens, and UV bulbs are kept on board the vessel. The system is inspected daily for clogs, level switches and other items. Sampling is done on board for COD (permeate of each line separately, and after UV) and for pH and chlorine after UV. A small laboratory area (photo #18) is used for the testing. All other sampling is done by an on-shore laboratory.

Sampling is not required per the MOU when not approved and not discharging. No samples were taken by Ecology.

The blackwater system has had some recent higher results for Biochemical Oxygen Demand (BOD). One of the blowers for the buffer tank had failed and was fixed. The lack of air to the buffer tank could have been the cause of the elevated BOD results. Also, the sampling line may not have been flushed out properly for the latest sample.

Conclusions and Recommendations

Staff seemed very knowledgeable of the protocols and systems. The discharge protocols and notification procedures were very clear.

The efforts made towards waste minimization and energy conservation are impressive.

It is recommended that staff continue to work towards high functioning wastewater treatment systems.

Attachments:

Photographs

Discharge records (copies requested during inspection)

Copies to:

William Morani, Jr., HAL

Bob Diaz, HAL

John Turvey, HAL

Tina Stoltz, HAL

Ted Arnold, Environmental Officer

Amy Jankowiak, Ecology

Mark Toy, Health

Kevin Fitzpatrick, Ecology

Central Files: Holland America Line – HOLLAND OOSTERDAM; WQ 6.1

Section I: Signatures

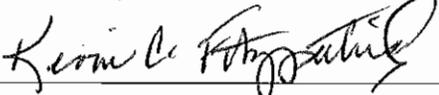
<u>Name and Signature of Inspector</u> Amy Jankowiak 	<u>Agency/Office/Telephone</u> Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	<u>Date</u> 7/15/08
<u>Name and Signature of Reviewer</u> Kevin C. Fitzpatrick 	<u>Agency/Office/Telephone</u> Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	<u>Date</u> 7/15/08



PHOTO #:01 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P6070067
DESCRIPTION: OOSTERDAM VESSEL AT PIER 30, SEATTLE

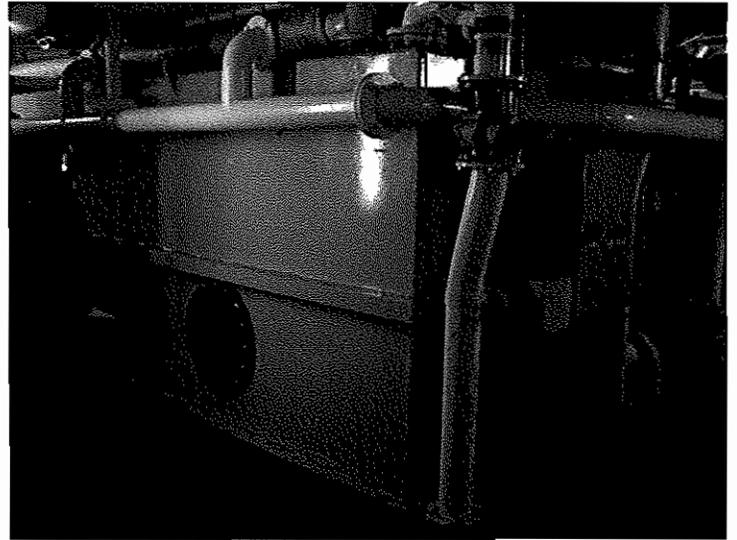


PHOTO #:02 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070068
DESCRIPTION: BLACKWATER SYSTEM BUFFER TANK

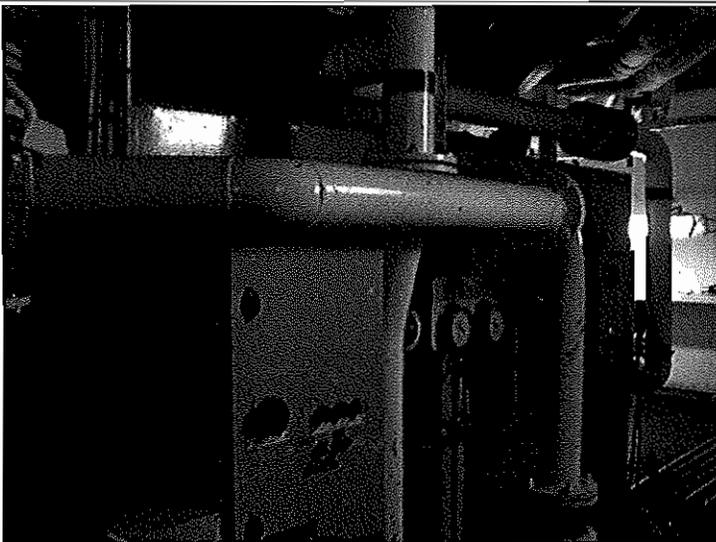


PHOTO #:03 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070069
DESCRIPTION: BLACKWATER SYSTEM BUFFER TANK



PHOTO #:04 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070070
DESCRIPTION: BLACKWATER SYSTEM MBR'S LINE 3 (2 UNITS)



PHOTO #05 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070071
DESCRIPTION: BLACKWATER SYSTEM MBR'S ULTRA FILTERS
(LINE 3)

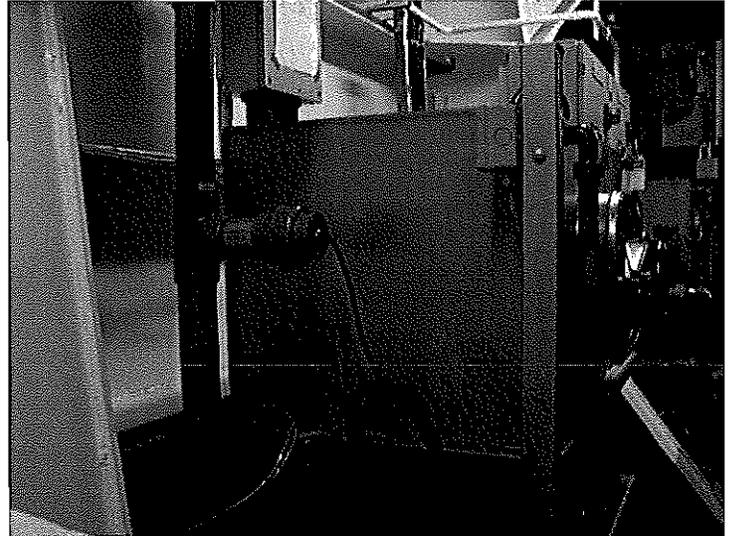


PHOTO #06 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070072
DESCRIPTION: BLACKWATER SYSTEM PERMEATE TANK AND
TURBIDIMETER (LINE 3)

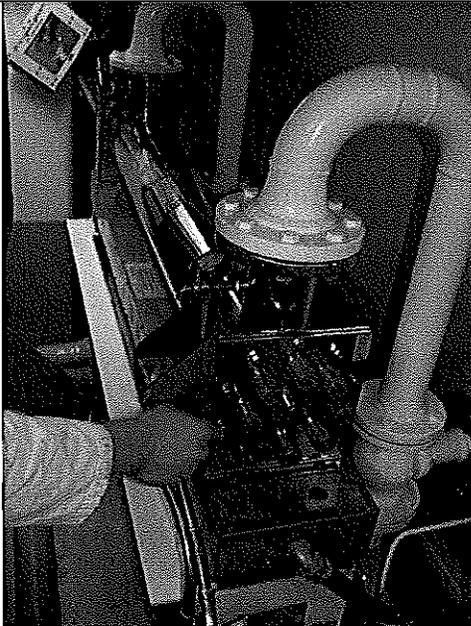


PHOTO #07 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070073
DESCRIPTION: BLACKWATER SYSEM ULTRAVIOLET DISINFECTION
UNIT



PHOTO #08 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070075
DESCRIPTION: BLACKWATER SYSEM ULTRAVIOLET DISINFECTION
UNIT PANEL (8 LIGHTS)

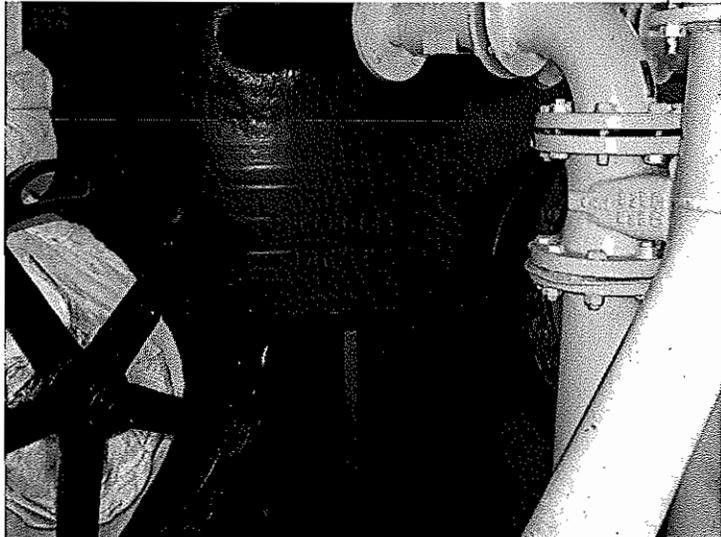


PHOTO #:09 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070076
DESCRIPTION: BLACKWATER COLLECTION TANK



PHOTO #:10 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070077
DESCRIPTION: BLACKWATER SYSTEM CLEANING TANK (FRONT),
PERMEATE TANK FOR LINE 1 (BACK)

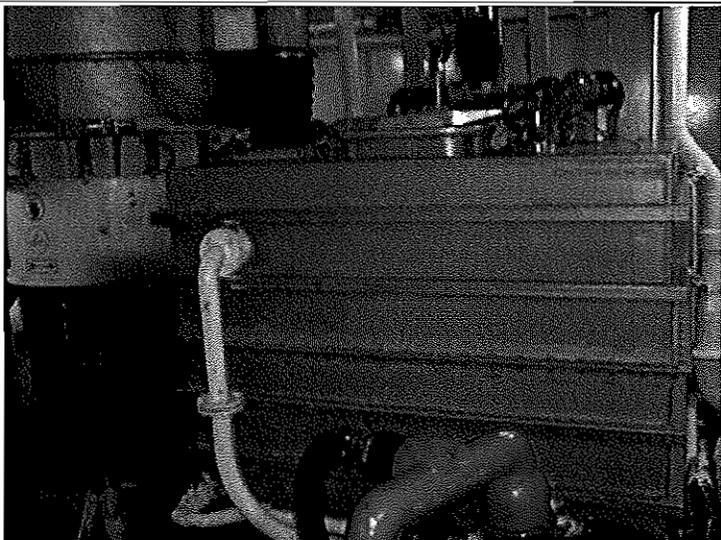


PHOTO #:11 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070078
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER SYSTEM
(SOLIDS TANK ON RIGHT, VIBRATING FILTER ON LEFT, TEMP PUMP
FRONT)

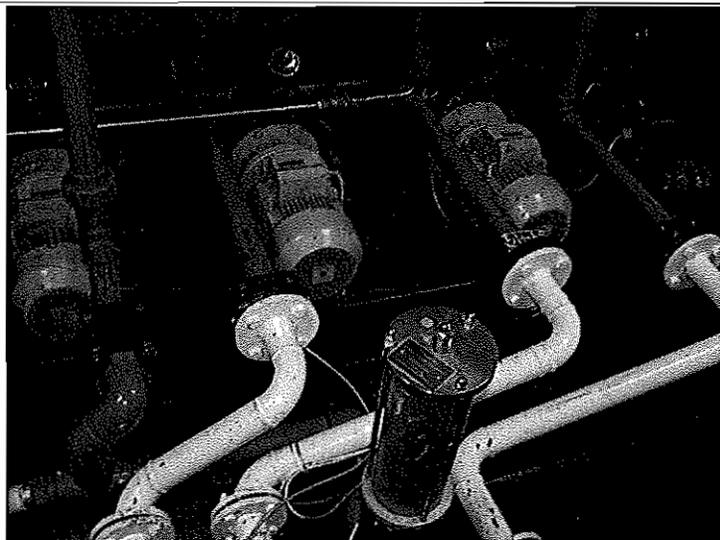


PHOTO #:12 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070079
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER PUMPS

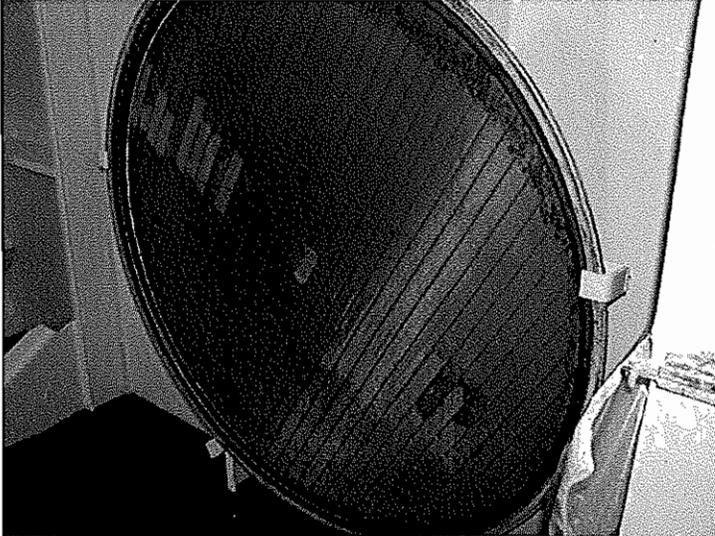


PHOTO #:13 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P6070080
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER – OLD
FILTER

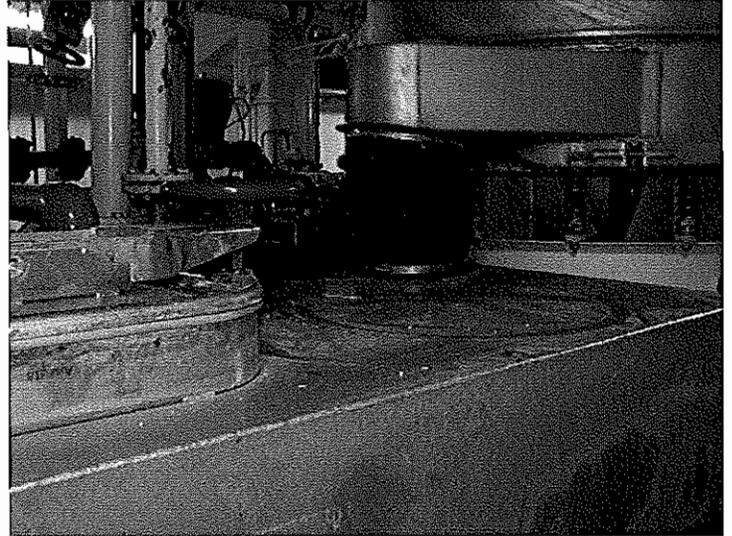


PHOTO #:14 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070081
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER, VIBRATOR
TO FILTRATE TANK



PHOTO #:15 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070082
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER, INSIDE
OF FILTRATE TANK



PHOTO #:16 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070083
DESCRIPTION: BLACKWATER SYSTEM SWECO FILTER, INSIDE
OF SOLIDS TANK



PHOTO #:17 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P6070084
DESCRIPTION: BLACKWATER SYSTEM SPARE MEMBRANES



PHOTO #:18 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070086
DESCRIPTION: ON-BOARD SAMPLING LABORATORY AREA



PHOTO #:19 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070087
DESCRIPTION: GARBAGE AREA SORTING CANS

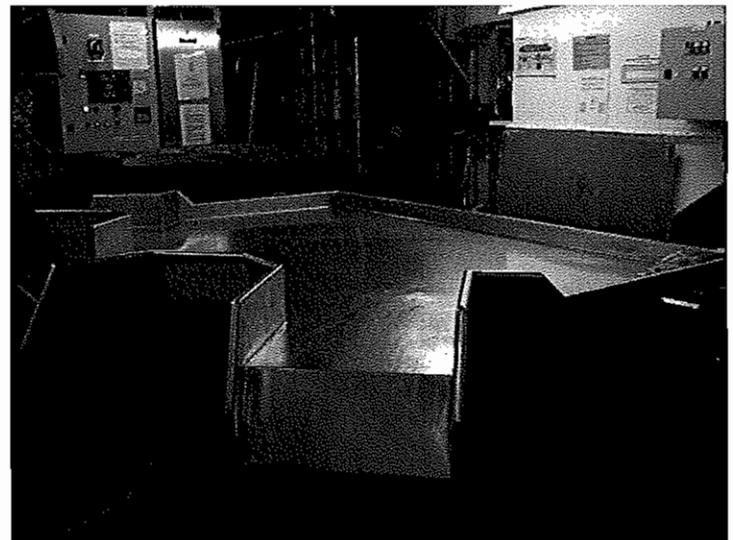


PHOTO #:20 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070088
DESCRIPTION: GARBAGE AREA SORTING TABLE



PHOTO #:21 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P6070089
DESCRIPTION: GARBAGE AREA FOOD WASTE COLLECTION

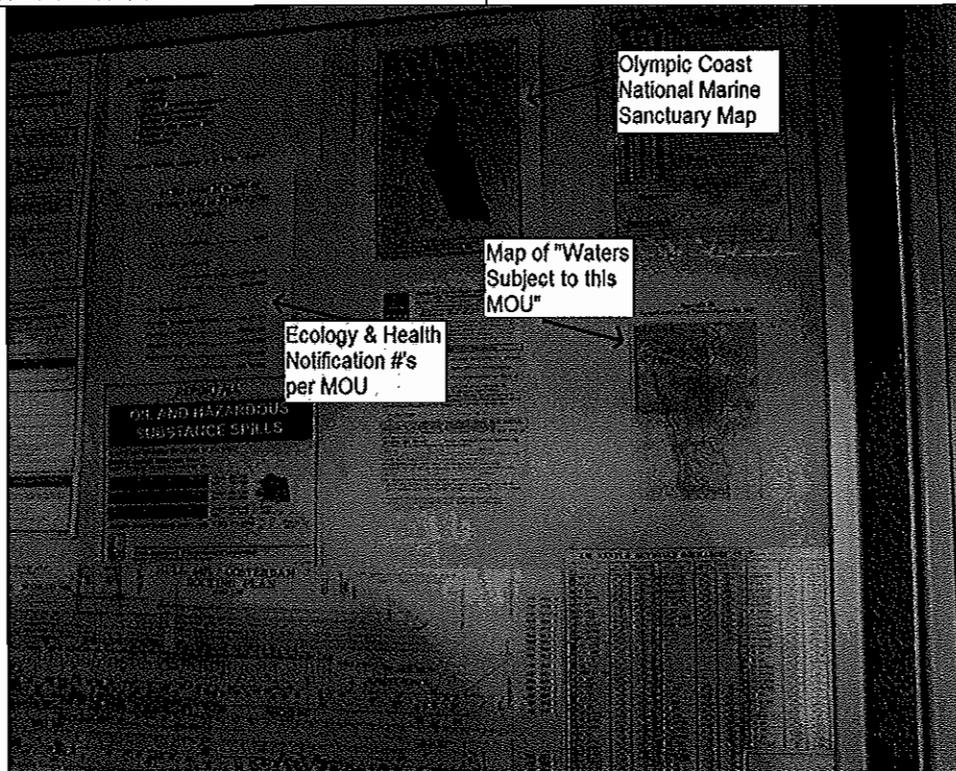


PHOTO #:22 DATE: JUNE 7, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6070090
DESCRIPTION: BRIDGE NOTIFICATIONS AND MAPS ON BOARD



State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

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Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
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<input type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring	Not Applicable
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable

	<u>Turbidity or equivalent</u> : Last calibration Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	Not Applicable
<input type="checkbox"/>	Disinfection immediately prior to discharge	Not Applicable
<input type="checkbox"/>	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section E: General (Approved to Discharge)

<input checked="" type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	No discharges are currently occurring within Waters subject to the MOU.
<input checked="" type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	No discharges are currently occurring within Waters subject to the MOU. They do have their systems set up to automatically shut down the discharge if high turbidity occurs.
<input checked="" type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	No discharges are currently occurring within Waters subject to the MOU.
<input checked="" type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted, although not necessary as not approved to or discharging in Waters subject to the MOU.
<input checked="" type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Not required at this time.
<input checked="" type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols are being put in place.
<input checked="" type="checkbox"/>	Immediate notifications to Health for GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. They do have protocols in place for notifications.

Section F: General

<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present (vessel last here in 2006 and last inspected August 27, 2006.
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Residual solids are either incinerated or held to be discharged at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste off-loads.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste off-loads.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.

Other:

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program conducted the inspection of the Holland America Line WESTERDAM on June 22, 2008. The main contacts on board the WESTERDAM included Kees Kant, Environmental Officer, Daniel Dan, 3rd Engineer and AWWPS Operator, and Robert Diaz, Deputy Director, Environmental Compliance HAL. Prior notification of the visit was given on June 19, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. The WESTERDAM is currently not approved for and is not discharging black or graywater into MOU waters. The vessel has requested and received approval for discharge at greater than one nautical mile from shore and at greater than six knots in 2006. Discharge approval has not been granted for the 2008 season. Discharges are being held until outside MOU waters.

The HOLLAND WESTERDAM was dedicated in 2004, and is 936 feet long with a width of 105.8 feet. There passenger capacity is 1848 and the crew capacity is 800. The vessel is powered with on-shore power during port calls in Seattle.

Inspection

I arrived and boarded the ship (photo #01) at about 9:02 am and began with introductions and a plan for the day with the Kees Kant, the Environmental Officer and Bob Diaz with Holland America Line. We then discussed various waste streams, and the discharge protocols. Discharge records were reviewed for blackwater and graywater discharges, hazardous waste off-loads, oil and garbage. We then viewed and discussed the black water treatment system. Next, we toured the Hazardous waste storage, and the garbage sorting area. The inspection was then finalized and I disembarked the vessel at about 10:58 am.

Discharge Types and Protocols:

All discharges to water occur at greater than 12 nautical miles and outside of MOU waters. No discharges occur in the Olympic Coast National Marine Sanctuary. Only upon verification of location between the Bridge and the Engine Control Room (ECR), will a discharge occur at greater than 12 nautical miles and outside of MOU waters. If a discharge is allowed, the Bridge authorizes any discharge. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. There is an overboard valve monitoring system on the bridge. The system has four lights:

- >12 nm
- > 4, <12 nm
- <4 nm
- Special Areas

The "special areas light" means no discharges. The computer system "Overboard Valve Monitoring" system details where certain discharges can and cannot take place and includes alarms. When any overboard valve is open, the location (lat and long) is automatically recorded (open and close). The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, volumes, and speed. Discharges are tentatively scheduled ahead of time by matrix, but locations are always verified prior to discharges. All discharge records that were reviewed appeared to be in compliance with the MOU.

Blackwater, which includes toilet waste, Galley waste, infirmary drains and crew waste, is treated with a Rochem membrane bioreactor and ultrafiltration system and is then discharged outside of MOU waters. The graywater system, Rochem low pressure reverse osmosis system, is currently not operational and therefore graywater is collected, held and discharged outside of MOU waters.

Screenings and grit from the blackwater system are collected and incinerated. The solids separated out from the blackwater system at the SWECO filter and from the bioreactors, known by the cruise lines as "biomass", is collected into a tank and discharged outside of MOU waters, >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool and spa water is discharged outside of MOU waters.

Food waste is collected in various locations including the galley and the garbage sorting area (photo #12). The food is shredded to one inch and incinerated. The liquid food waste is sent to the graywater system. Food waste is hand checked for plastics and other materials and is sorted prior to shredding. Grease is collected separately and off-loaded to shore, often for biodiesel use.

Oily bilge water is sent to the 50 ppm oily water separator, then to the intermediate tank and then to the 15 ppm oily water

separator. If the effluent does not meet 15ppm, it is automatically sent back for further treatment. The effluent that meets 15 ppm is either discharged at greater than 12 nautical miles and outside of MOU waters or is sent to a clean tank and later discharged. All effluent first goes through the "white box" for monitoring prior to discharge.

Potable water is bunkered now and then, while the rest is produced by desalination. Steam from the boilers heat up the sea water with low pressure evaporation. The condensate is then chlorinated and adjusted for pH prior to distribution. Salt collected from the evaporators is sent back to the sea. Scaling is treated with acid and is then neutralized prior to discharge at sea.

Air conditioning condensate is collected and re-used as technical water.

Laundry water is sent to the graywater system. Eco-Lab products are used for the laundry and cleaning. Dry cleaning currently uses Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste in Victoria (approximately 25 liters/month). The dry cleaning system will soon be replaced with a banana oil-based product replacing the PERC.

Silver is captured from the photo waste, collected and off-loaded as non-hazardous waste in Victoria. Digital photos are used primarily. All hazardous wastes to shore are off-loaded in Victoria.

Medical waste that is not hazardous is collected in white bags and incinerated. Red bags are used for material containing bodily fluids, and along with sharps are collected and sent to shore with hazardous waste. X-ray's are done digitally, and therefore there is no x-ray waste. Medications that are expired or not used are sent back to the manufacturer.

Paint waste, batteries and oil sludge are also off-loaded with hazardous waste (photos #10 & #11) in Victoria.

Plastics, garbage, and other materials are collected and sorted into various color-coded cans and sorted on a sorting table (photo #13). The materials are then condensed and recycled on-shore. The garbage, oily rags and food-contaminated cardboard is incinerated. Cardboard is collected and off-loaded for recycling (approximately 4-5 pallets per week). Glass, aluminum, tin, paper, and plastics are all recycled along with other materials. The amount of materials collected and recycled is maximized in order to minimize the amount of materials incinerated or land filled. Fluorescent light bulbs are collected, crushed in a system that collects the mercury vapors. The material is then off-loaded with hazardous waste.

Holland America Line is ISO 14001 Certified. The WESTERDAM is equipped for shore power in Seattle and was connected during the inspection.

Graywater System:

The graywater system, Rochem low pressure reverse osmosis (LP-RO), was not operational during the inspection. Graywater is being collected held and discharged outside of MOU waters. Holland America Line continues to work with Rochem on trouble-shooting the system. The graywater system, when operational, collects graywater to collection tanks. The graywater is then sent to a buffer tank and then to the SWECO prefiltration system. Graywater then moves to the LP-RO for treatment. Approximately 15% of the graywater reject is sent to the blackwater system. Effluent from the LP-RO moves to permeate tanks prior to disinfection treatment via ultraviolet disinfection. Effluent is then held or discharged outside of MOU waters.

Blackwater System:

Daniel Dan, 3rd Engineer and AWWPS operator, joined us to describe the blackwater system, Rochem UF; ultrafiltration, and tour the system. Toilet waste, Galley waste, infirmary drains, and crew waste goes by vacuum to one of five collection tanks and then to a buffer tank (photo #02). Fine bubble diffusion adds air into the buffer tank. Screenings collected by a filter are sent to incineration.

From the buffer tank, flow is sent to prefiltration through the SWECO system (photo #03). Screenings are filtered out and sent to incineration. The SWECO system vibrates out the solids to the solids tank (photo #04) where it combines with solids from the bioreactors and is sent to another tank (5S) for holding and discharge outside of MOU waters. The filters are cleaned about once a month by cleaning the grease off and flushing with fresh water. Filtrate from the SWECO is collected to a tank and then sent to the bioreactors. PH is adjusted and conductivity monitored prior to going to the bioreactors (photo #05).

There are three bioreactor lines. Lines 1 and 2 have four MBR units, and Line 3 has two MBR units for a total of ten. The biological activity takes place in the bioreactors. Solids in the bioreactors are returned back to the beginning of the bioreactors to enhance activity. A minimal amount of solids are periodically wasted to the solids tanks. Total Suspended Solids (TSS) are monitored continuously at the bioreactors. Oxygen levels are also monitored.

From the bioreactors, flow goes through the membranes for ultrafiltration (UF) (photo #06). The membranes are cleaned by

flushing with air and reverse direction flow. Turbidity is also monitored continuously after the permeate (photo #07). Effluent or permeate from the UF's are sent to the permeate tanks. All three lines then combine at one ultraviolet light disinfection system (photo #08). The UV system consists of 8 lights and a control board (photo #09) has a lighted alarm if any of the bulbs are out. Intensity or wattage is not monitored with this system. The glass sleeves on the bulbs are wiped with a rag about once a month. Once a year, the full set of bulbs is replaced. Spares are available on board. From the UV, the flow can either go straight overboard, it can be combined with the graywater system effluent, or can go to storage tanks. The blackwater system is currently not discharging in MOU waters.

The blackwater system had been experiencing some elevated ammonia levels. A blocked air line was causing the problem. The manufacturer was contacted and the line was fixed. A regular schedule to check the air lines has been put in place.

A high alarm is set for turbidity reaching 15.5 FNU (formazin nephelometric unit), and a high high alarm is set at 25 FNU which automatically shuts down any discharge.

A maintenance program, AMOS, triggers maintenance required such as oiling and greasing motors. Spare blowers, motors, membranes, screens, and UV bulbs are kept on board the vessel. Sampling is done on board for COD (permeate of each line separately, and after UV) and for pH and chlorine after UV. A small laboratory area is used for the testing. All other sampling is done by an on-shore laboratory.

Sampling is not required per the MOU when not approved and not discharging. No samples were taken by Ecology.

Conclusions and Recommendations

Staff seemed very knowledgeable of the protocols and systems. The discharge protocols and notification procedures were very clear.

The efforts made towards waste minimization and energy conservation are impressive.

It is recommended that staff continue to work towards high functioning wastewater treatment systems.

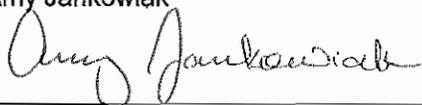
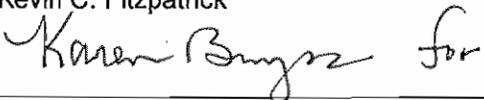
Attachments:

Photographs

Copies to:

- William Morani, Jr., HAL
- Bob Diaz, HAL
- John Turvey, HAL
- Tina Stoltz, HAL
- Kees Kant, Environmental Officer
- Amy Jankowiak, Ecology
- Mark Toy, Health
- Kevin Fitzpatrick, Ecology
- Central Files: Holland America Line – HOLLAND WESTERDAM; WQ 6.1

Section I: Signatures

<u>Name and Signature of Inspector</u>	<u>Agency/Office/Telephone</u>	<u>Date</u>
Amy Jankowiak 	Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	8/14/08
<u>Name and Signature of Reviewer</u>	<u>Agency/Office/Telephone</u>	<u>Date</u>
Kevin C. Fitzpatrick 	Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	8/15/08

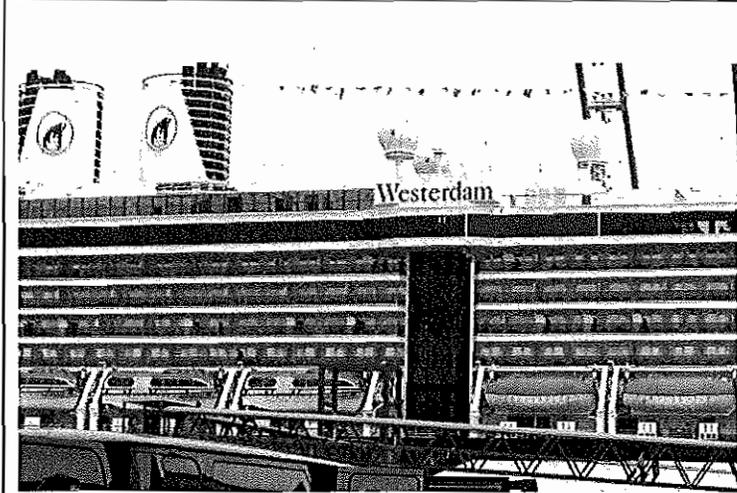


PHOTO #:01 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220067
DESCRIPTION: WESTERDAM VESSEL AT PIER 30, SEATTLE

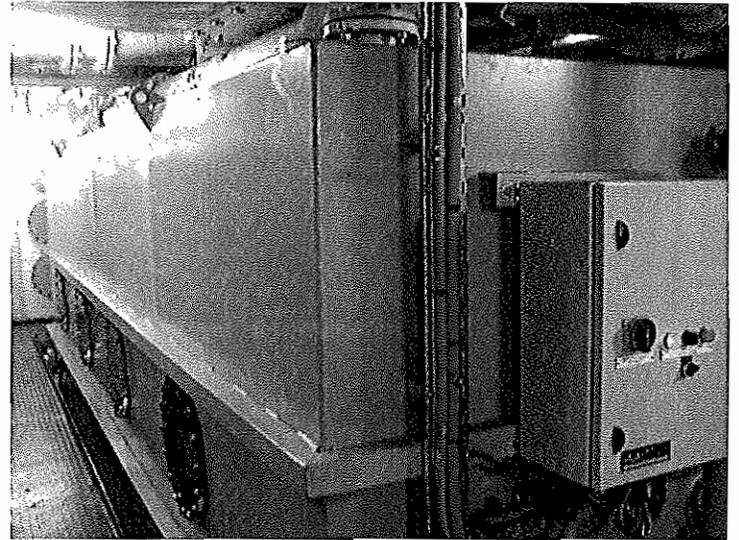


PHOTO #:02 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220068
DESCRIPTION: BLACKWATER BUFFER TANK

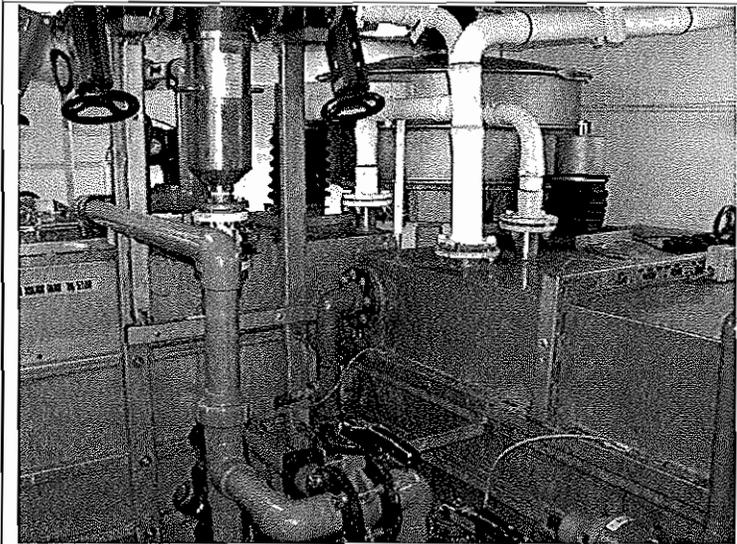


PHOTO #:03 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220070
DESCRIPTION: BLACKWATER SWECO FILTER SYSTEM



PHOTO #:04 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220071
DESCRIPTION: INSIDE OF BLACKWATER SWECO SOLIDS TANK

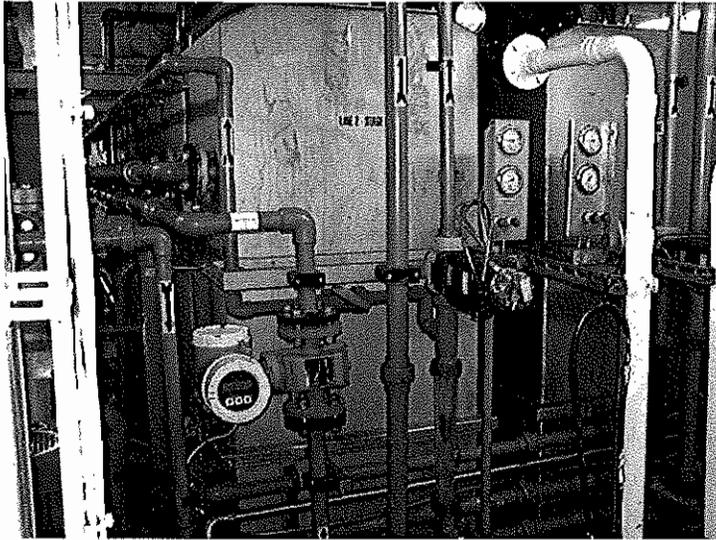


PHOTO #:05 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220072
DESCRIPTION: BLACKWATER SYSTEM BIOREACTORS

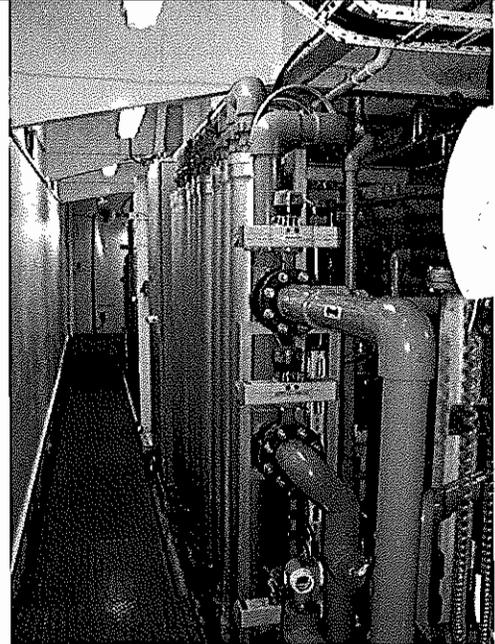


PHOTO #:06 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220073
DESCRIPTION: BLACKWATER SYSTEM MEMBRANES

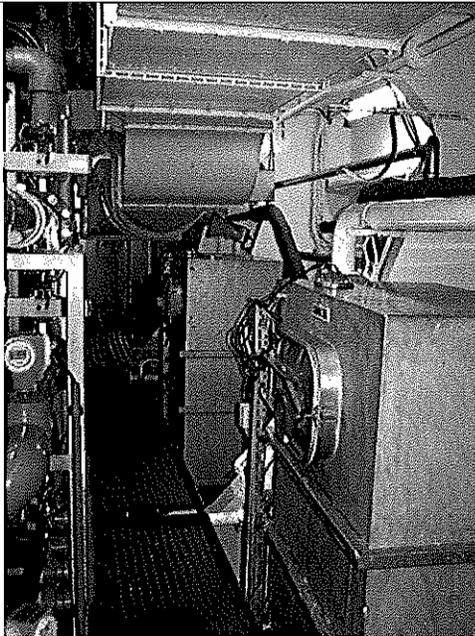


PHOTO #:07 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220074
DESCRIPTION: BLACKWATER SYSTEM CLEANING TANK (FRONT)
AND PERMEATE TANK (BACK)

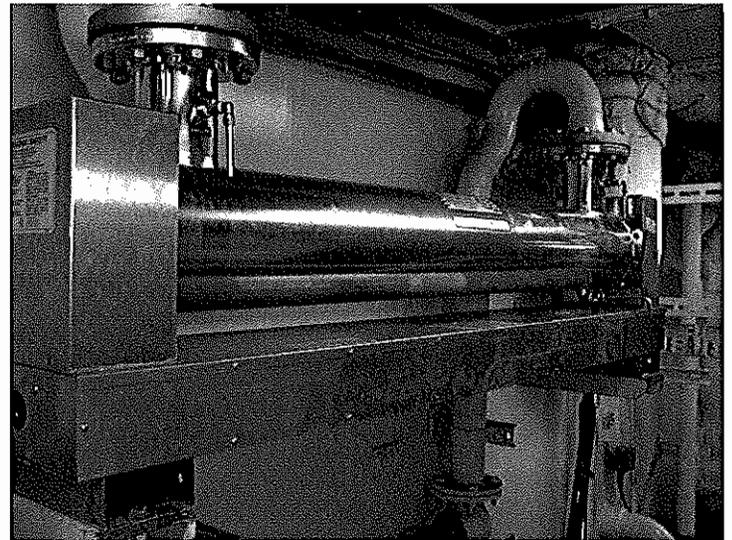


PHOTO #:08 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220075
DESCRIPTION: BLACKWATER SYSTEM ULTRAVIOLET LIGHT
DISINFECTION SYSTEM



PHOTO #:09 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P6220076
DESCRIPTION: BLACKWATER SYSTEM ULTRAVIOLET LIGHT
DISINFECTION SYSTEM CONTROL PANEL

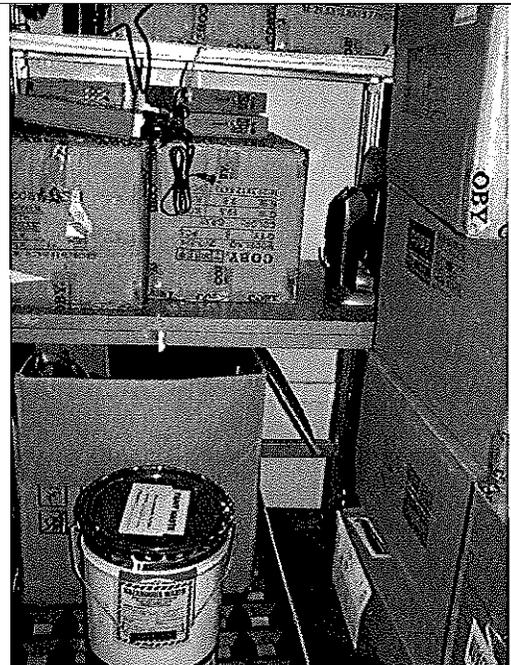


PHOTO #:10 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220077
DESCRIPTION: HAZARDOUS WASTE STORAGE

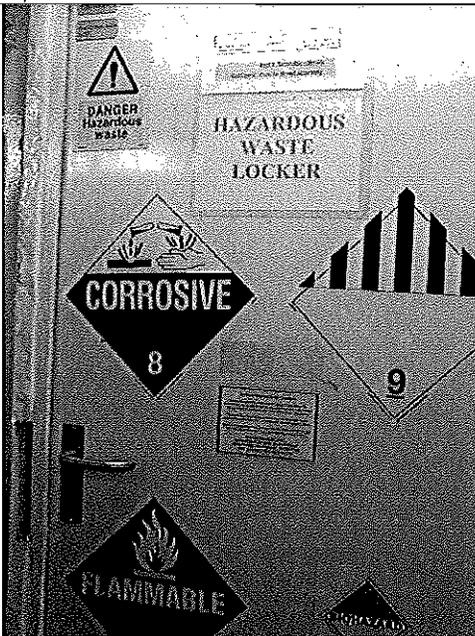


PHOTO #:11 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220078
DESCRIPTION: HAZARDOUS WASTE STORAGE DOOR WITH
LABELS

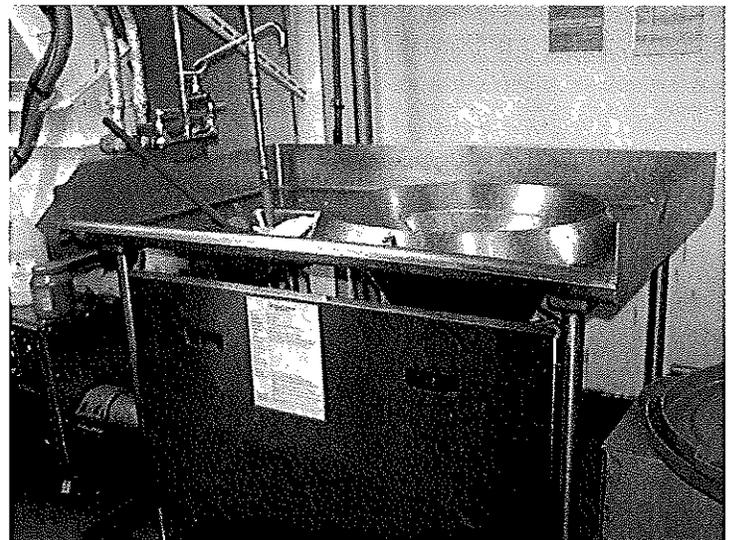


PHOTO #:12 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220079
DESCRIPTION: FOOD WASTE COLLECTION SYSTEM IN GARBAGE
SORTING ROOM

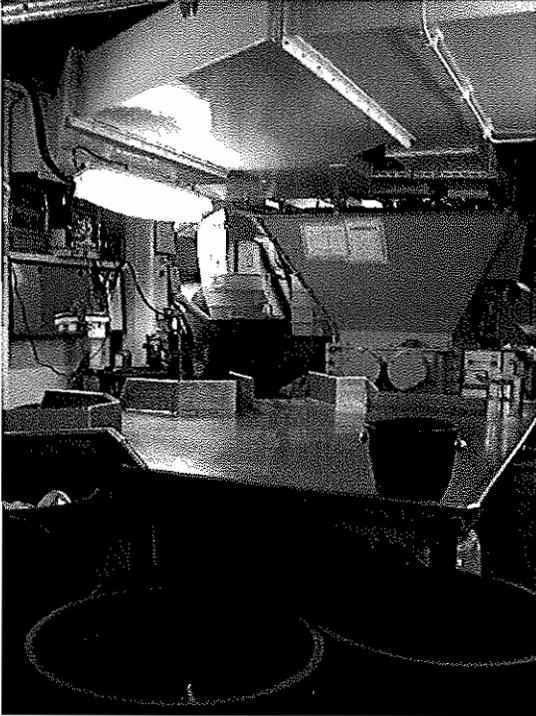


PHOTO #:13 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P6220080
DESCRIPTION: WASTE SORTING AREA



State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	STAR PRINCESS	Date:	June 22, 2008
Vessel Operator:	Princess Cruises	Entry Time:	12:31 PM
Vessel Type	Passenger Ship	Exit Time:	2:50 PM
Location:	Pier 30, Seattle	Notification (name & date):	A. Lorenzano and D. Hutchinson on June 19, 2008
On-board contact(s):	Virginie Stirbois, Environmental Officer and Agostino Salza, Staff Engineer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:			

The STAR PRINCESS arrived on May 4th, 2008 at the Port of Seattle to begin the 2008 cruise season. Hamworthy is a biological reactor and ultrafiltration system. The system includes screening via a screen press, biological treatment via bio-reactors with inter-stage filters and a membrane system, and ultraviolet light disinfection (although not yet completely installed or operational). Approval for continuous discharge from Ecology was granted on May 12, 2008, however, the vessel has been holding effluent and not discharging in MOU waters since the beginning of the season.

Section B: Areas Evaluated

<input checked="" type="checkbox"/>	Black/Gray wastewater system	<input checked="" type="checkbox"/>	Residual solids	<input checked="" type="checkbox"/>	Records/Reports	<input checked="" type="checkbox"/>	Hazardous Waste/Solid Waste	<input checked="" type="checkbox"/>	Sampling/Monitoring
<input checked="" type="checkbox"/>	Discharge locations	<input checked="" type="checkbox"/>	Operations & Maintenance	<input checked="" type="checkbox"/>	Sludge Handling/Disposal	<input checked="" type="checkbox"/>	Oily bilge water	<input checked="" type="checkbox"/>	Other

Section C: For vessels discharging ≥ 1 nm from berth and ≥ 6 knots only [2.1.3(A)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	
<input type="checkbox"/>	Operations as described in submitted documentation	
<input type="checkbox"/>	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
<input type="checkbox"/>	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	Schematics matched with the exception of the UV disinfection system which was only partially installed and was not operational.
<input type="checkbox"/>	Operations as described in submitted documentation	Operations were as described with the exception of the UV disinfection system which was only partially installed and not operational.
<input checked="" type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring	Continuous turbidity for monitoring. There are turbidity meters on each of the three MBR permeate tanks.
<input checked="" type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Appears to be functioning properly.

	Turbidity or equivalent : Last calibration – Maintenance program triggers need for calibration Trigger level for early alarm: 6 NTU Trigger level for shutdown: 30 NTU Recorded turbidity/equivalent levels above triggers: Not this season	
<input checked="" type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	A value of 30 NTU or greater triggers shut down (also alarmed at 6 NTU).
<input checked="" type="checkbox"/>	Disinfection immediately prior to discharge	Protocol: When discharging, UV occurs immediately prior to discharge.
<input type="checkbox"/>	Disinfection system operated and maintained properly	The disinfection system is not completely installed or operational.
	Disinfection System:	

Section E: General (Approved to Discharge)

<input checked="" type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	No discharges are currently occurring within Waters subject to the MOU.
<input checked="" type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	No discharges are currently occurring within Waters subject to the MOU. They do have their systems set up to automatically shut down the discharge if high turbidity occurs.
<input checked="" type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	No discharges are currently occurring within Waters subject to the MOU.
<input checked="" type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted as required, as of the date of the inspection.
<input checked="" type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Not required at this time.
<input checked="" type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols should be in place.
<input checked="" type="checkbox"/>	Immediate notifications to Health for GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols should be in place.

Section F: General

<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Residual solids are either incinerated or held to be discharged at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.

Other:

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	<10 mg/l
Total Suspended Solids (TSS)	<1 mg/l
Fecal Coliform	<1 CFU/100 ml
Residual Chlorine	<0.1 mg/l
pH	6.70 unit
Ammonia, Nitrogen	3.5 mg/l

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program conducted the inspection of the Princess Cruises STAR PRINCESS June 22, 2008. The main contacts on board the STAR PRINCESS included Virginie Stirbois, Environmental Officer and Agostino Salza, Staff Engineer. Prior notification of the visit was given on June 19, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. A copy of the current MOU was not available on-board. A paper copy was left with the Environmental Officer for her use. The STAR PRINCESS received approval to discharge continuously on May 12, 2008. The vessel has not been discharging and is holding effluent until outside MOU waters.

The STAR PRINCESS was placed into service in 2002, and is 951 feet long with a width of 118 feet.

Inspection

I arrived and boarded the ship (photo #01) at about 12:31 pm and began with introductions and a plan for the day with Virginie Stirbois, the Environmental Officer. We then discussed various waste streams, and the discharge protocols. Discharge records were reviewed for blackwater and graywater discharges and hazardous waste off-loads. We then took samples of the Hamworthy effluent and viewed and discussed the black water and gray water treatment system. Next, we toured the garbage sorting area and hazardous waste storage area. The inspection was then finalized and I disembarked the vessel at about 2:50 pm.

Discharge Types and Protocols:

If a discharge is allowed, the Bridge authorizes any discharge. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, volumes, and speed. All discharge records that were reviewed appeared to be in compliance with the MOU and did not occur in MOU waters.

Blackwater, which includes toilet waste and infirmary drains and graywater which includes sink and shower water is treated with a Hamworthy advanced wastewater treatment system and is currently discharged outside of MOU waters. Laundry water and galley water is collected separately, not treated, and held for discharge at greater than 4 nautical miles from land, at greater than 6 knots and outside of the Olympic Coast National Marine Sanctuary.

Screenings and grit from the Hamworthy system are collected and incinerated. The solids separated out by the bioreactors is discharged outside of MOU waters, >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool and spa water is discharged outside of 12 nautical miles.

Food waste is collected in various locations, is sent through a pulper and then goes to the gray water tanks. Grease is collected (photo #18) and recycled in Seattle.

Oily bilge water is treated with an oily water separator and discharged at less than 15 ppm after first going through a "white box" for monitoring (photo #17) and is discharged at greater than 12 nautical miles from land and at speed of greater than 6 knots and outside of the Olympic Coast National Marine Sanctuary.

Potable water is bunkered now and then, while the rest is produced by desalination. Steam from the boilers heat up the sea water with low pressure evaporation. The condensate is then chlorinated and adjusted for pH prior to distribution. Salt collected from the evaporators is sent back to the sea. Scaling is treated with acid and is then neutralized (between 6.5 and 7.2) prior to discharge at sea.

Air conditioning condensate is held and discharged as with graywater.

Dry cleaning currently uses Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste in Victoria. Other hazardous wastes include batteries, bulbs (no crusher on board), paints, oily rags, sludge oil, aerosols (punctured), and sharps. All hazardous wastes (photo #22) to shore are off-loaded in Victoria.

Silver is captured from the photo waste (photo #21), treated to less than 2 ppm and is incinerated. Medical waste that is not hazardous is collected in white bags and incinerated. X-ray's are done digitally, and therefore there is no x-ray waste. Other materials incinerated include garbage, some plastics, food-contaminated cardboard and food-contaminated tin.

Plastics, garbage, and other materials are collected and sorted into various color-coded cans and sorted on a sorting table. Most materials are then condensed and recycled on-shore. Cardboard is collected and off-loaded for recycling (photo #19). Glass (photo #20), aluminum, tin, paper, and plastics are all recycled along with other materials.

Black water and Gray water System:

The Hamworthy system (photo #02) consists of three separate membrane bioreactors (MBRs). Black water, which includes toilet waste and infirmity drains is collected by vacuum to one of five collection tanks (photo #12) and then combines with gray water which includes sink and shower water and is piped to a buffer tank (photo #13). From the buffer tank, flow moves to the screen press (photo #03). The solids are screened into bags (photo #04) and are then sent to the incinerator. The liquid moves to the 1st stage of the membrane bioreactor (photo #05) where aeration occurs (photo #11). From the 1st stage, flow moves to the Russell Filters (inter-stage filters – photo #06). The inter-stage filtered solids are returned back to the 1st stage. The liquid moves onto the 2nd stage of the MBR for further aeration. From the 2nd stage MBR, flow is sent to the membrane modules (photos #07 & #08) for ultrafiltration. Solids from the filters are sent back to the 2nd stage MBR. Effluent from the membrane modules are sent to a permeate tank (photo #09) where turbidity is monitored (photo #10). Flow then combines with the other two MBR's at the UV Permeate tank. From the UV Permeate tank, effluent moves through the ultraviolet (UV) disinfection system (once it is fully installed and operational – photos #14 and #15). Disinfected effluent either goes directly overboard or to a holding tank if not in an approved area for discharge. Currently, effluent from the permeate tanks is held and discharged outside of MOU waters.

Turbidity is measured continuously on each of the MBR permeate tanks. At the time of the inspection, MBR #1 was 0.7 and MBR #3 was 0.8. The meters are alarmed at 6 NTU with shut down at a 30 NTU maximum. Every 2-3 days, the membranes are switched out. Backwashing is done manually on the membranes and chemical cleaning occurs every few days. The Russell Filters are cleaned regularly. The membranes are cleaned by backwashing about once a week and is triggered by the pressure values.

The staff have a small laboratory on board where they sample for such parameters as total coliform, total suspended solids (TSS), chemical oxygen demand (COD), free and total chlorine, and pH, which are monitored on board about once a week. The on-board sampling allows for immediate results and a chance for immediate corrections to the system.

The UV disinfection system was supposed to be installed and operational by May 12th when the approval to discharge was granted. Ecology was not notified that the UV system had not yet been installed until the inspection. The vessel has not been discharging. At the time of the inspection, they were waiting for some cables and would need to have the contractor to come on board to finalize installation (maybe by Mid August).

Samples were taken for Biochemical Oxygen Demand (BOD 5-Day), Total Suspended Solids (TSS), pH, chlorine residual, fecal coliform and ammonia from the combined effluent of the MBR's prior to going to the holding tank. The sample port (photo #16) was cleaned prior to pulling samples. The samples were put on ice immediately and were transported to AmTest laboratory in Redmond, Washington that afternoon. Chain of Custody and sampling procedures were followed. All results are in Section F. The results are typical of the results submitted to Ecology thus far for 2008.

Conclusions and Recommendations

Until the ultraviolet disinfection is completely installed and operational, no discharges of Hamworthy effluent from the vessel are allowed.

It should be clear that a vessel can be more than 12 nautical miles from shore in some areas and still be in "Waters Subject to this MOU". All protocols for discharge outside of MOU waters should be clearly stated.

The laboratory testing on-board is an excellent way to monitor and make needed adjustments to the system. Having a laboratory on-board for the testing is ideal.

It is recommended that staff continue to work towards a high functioning wastewater treatment system.

Attachments:

Photographs

Laboratory Report

Copies to:

William Morani, Jr., HAL

Bob Diaz, HAL

John Turvey, HAL

Tina Stoltz, HAL

Virginie Stirbois, Environmental Officer

Amy Jankowiak, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Princess Cruises – STAR PRINCESS; WQ 6.1

Section I: Signatures

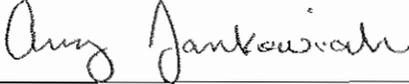
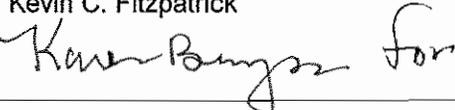
<u>Name and Signature of Inspector</u>	<u>Agency/Office/Telephone</u>	<u>Date</u>
Amy Jankowiak 	Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	8/14/08
Kevin C. Fitzpatrick 	Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	8/15/08



PHOTO #:01 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220105
DESCRIPTION: STAR PRINCESS VESSEL, PIER 30, SEATTLE

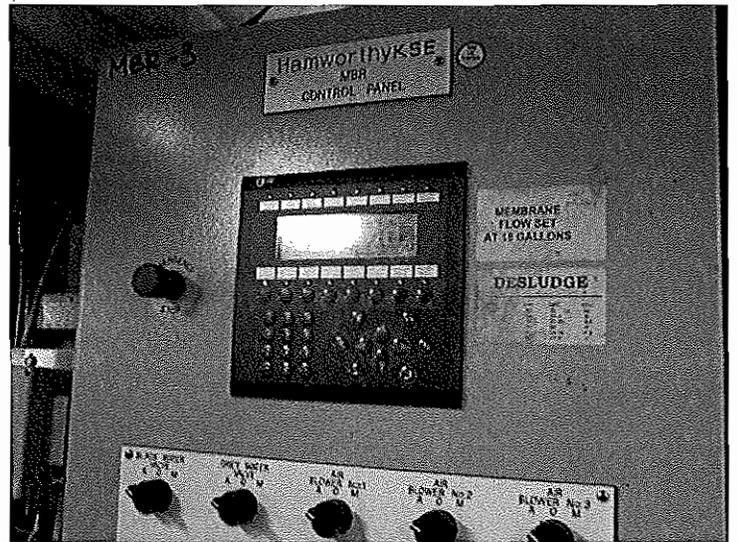


PHOTO #:02 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220081
DESCRIPTION: HAMWORTHY TREATMENT SYSTEM CONTROL PANEL

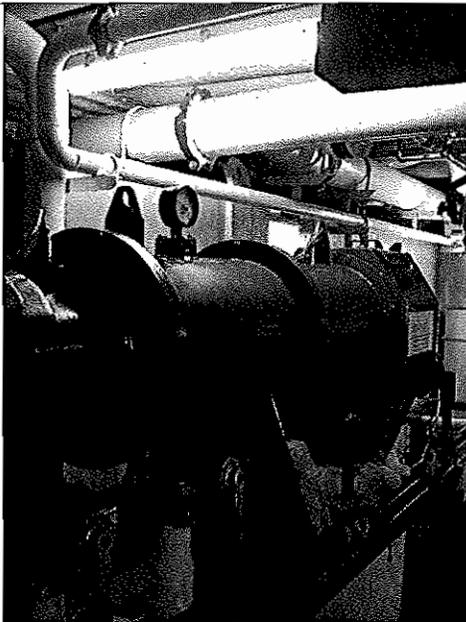


PHOTO #:03 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220082
DESCRIPTION: SCREEN PRESS



PHOTO #:04 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220083
DESCRIPTION: SCREEN PRESS SCREENINGS BAG



PHOTO #:05 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220084
DESCRIPTION: SCREEN PRESS WITH MBR BEHIND IT

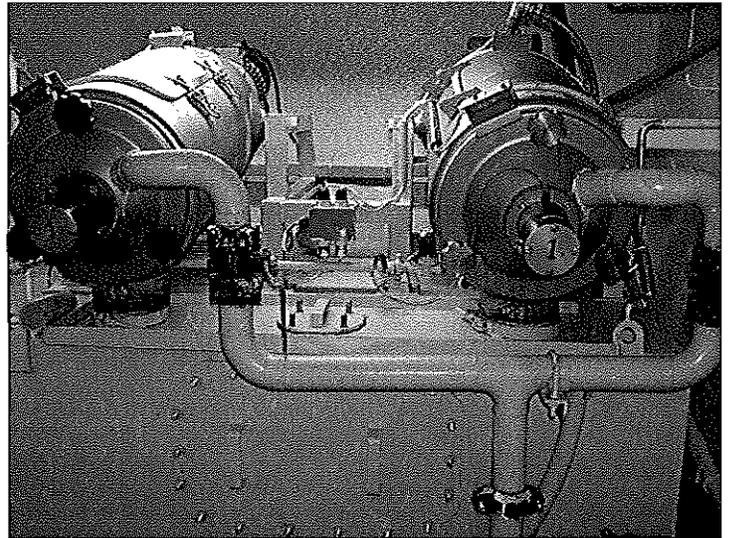


PHOTO #:06 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220085
DESCRIPTION: MBR RUSSEL FILTERS



PHOTO #:07 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220086
DESCRIPTION: MEMBRANES WITH PUMPS BEHIND

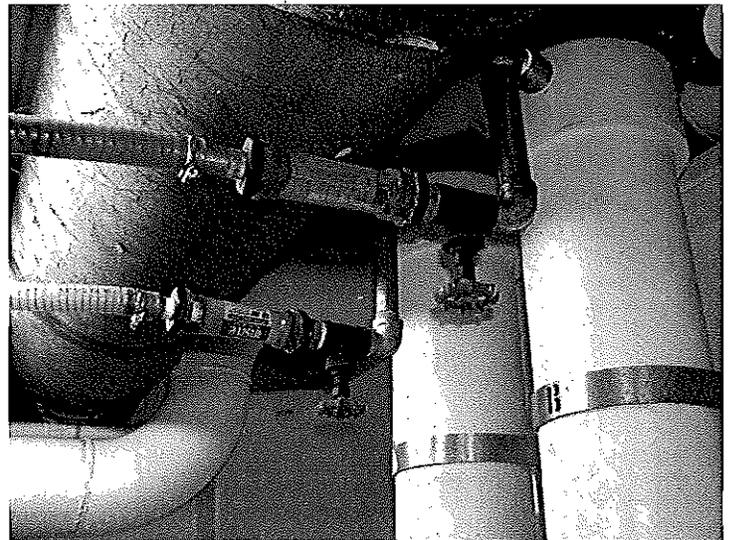


PHOTO #:08 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220087
DESCRIPTION: MEMBRANES WITH CLEAR TUBES SHOWING
MEMBRANE EFFLUENT

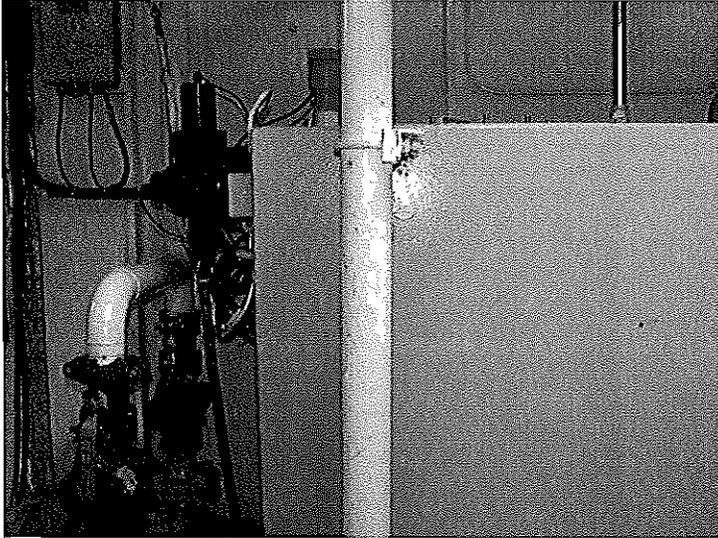


PHOTO #:09 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220088
DESCRIPTION: PERMEATE TANK

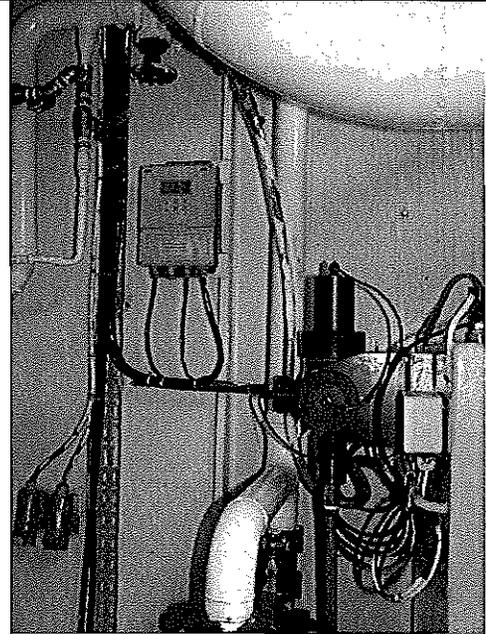


PHOTO #:10 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220089
DESCRIPTION: PERMEATE TANK TURBIDITY (0.06)

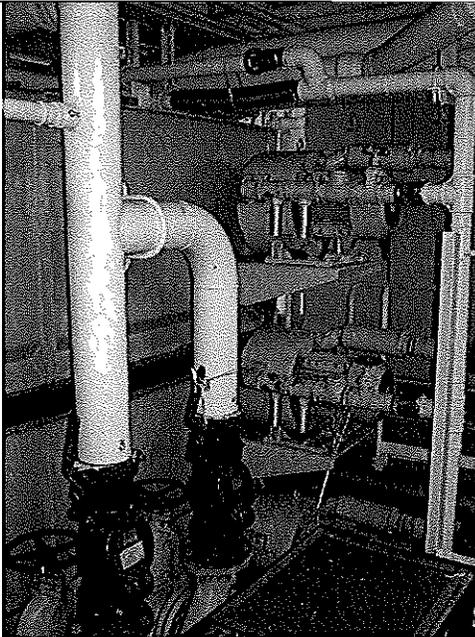


PHOTO #:11 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220090
DESCRIPTION: MBR PUMPS IN FRONT, BLOWERS (GREEN) IN
BACK

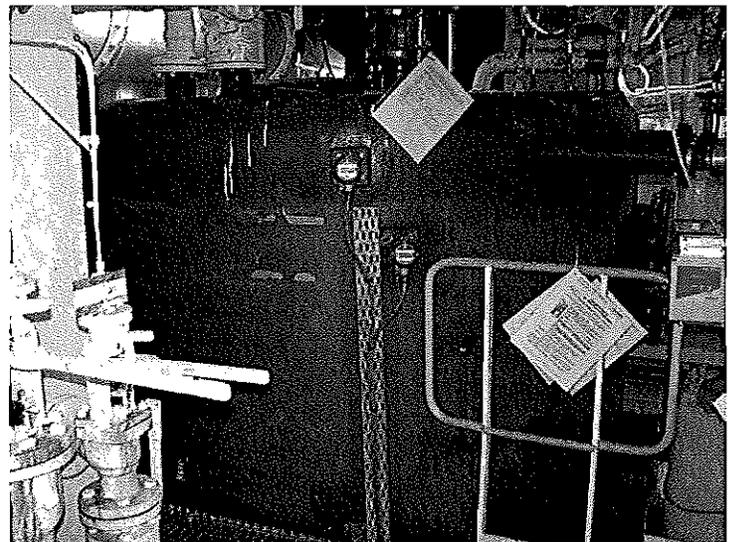


PHOTO #:12 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220091
DESCRIPTION: BLACKWATER COLLECTION TANK



PHOTO #:13 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220092
DESCRIPTION: BUFFER TANK (BLOWERS IN FRONT)

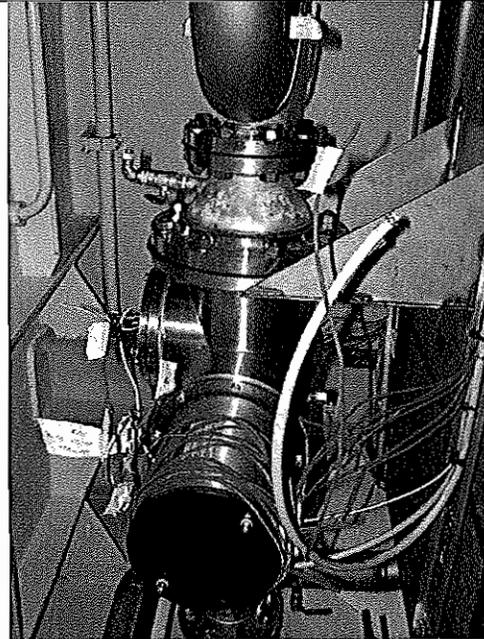


PHOTO #:14 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220094
DESCRIPTION: ULTRAVIOLET DISINFECTION (UV) SYSTEM

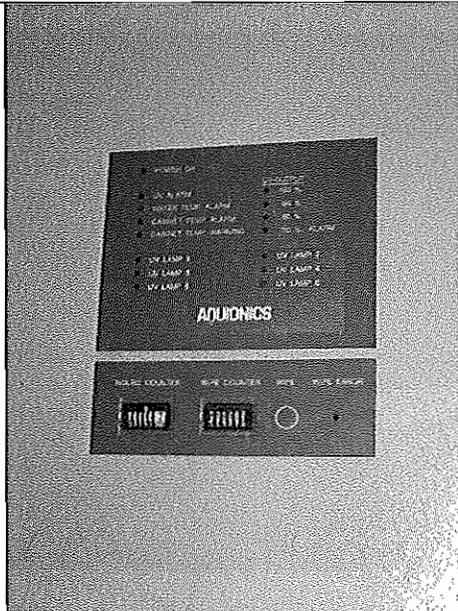


PHOTO #:15 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220095
DESCRIPTION: UV SYSTEM CONTROL PANEL

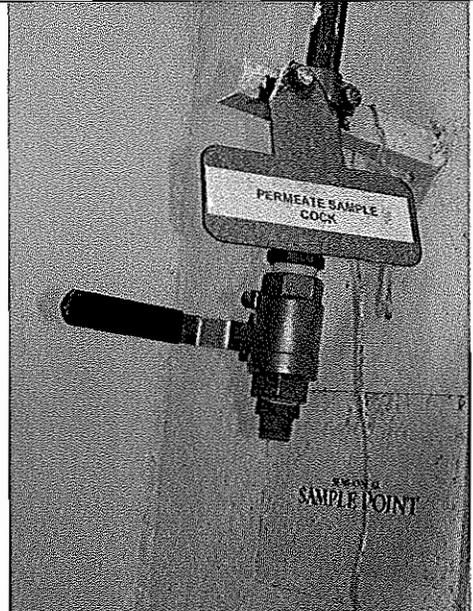


PHOTO #:16 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220096
DESCRIPTION: SAMPLE POINT

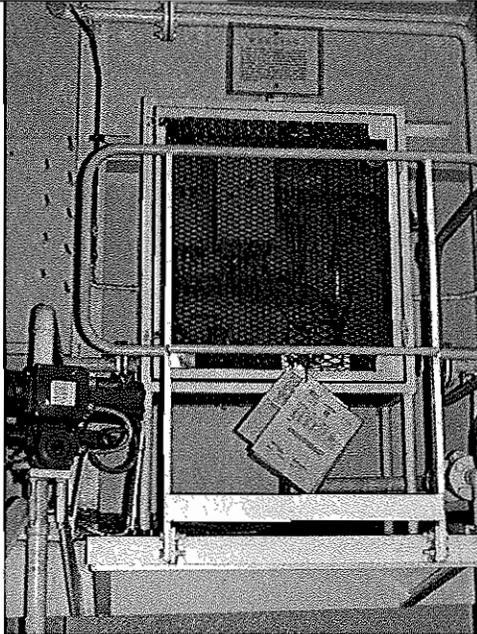


PHOTO #:17 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P6220097
DESCRIPTION: OILY BILGE WATER WHITE BOX

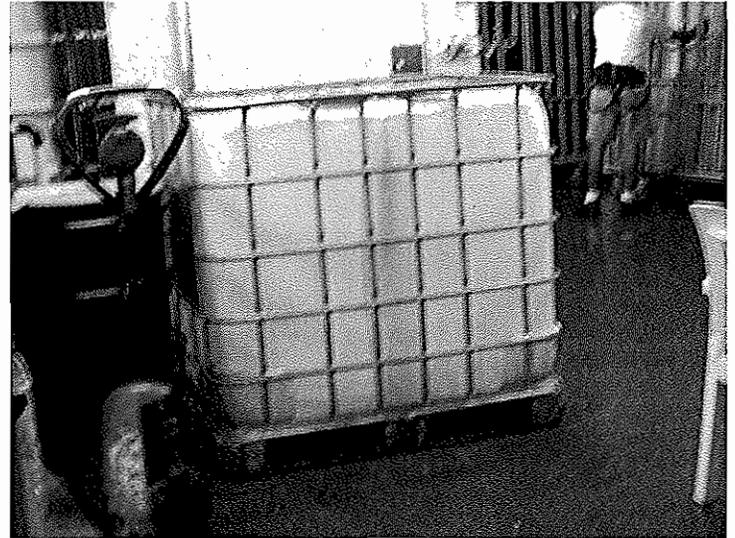


PHOTO #:18 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220098
DESCRIPTION: GREASE COOLING OIL CONTAINER (NEW EMPTY ONE)

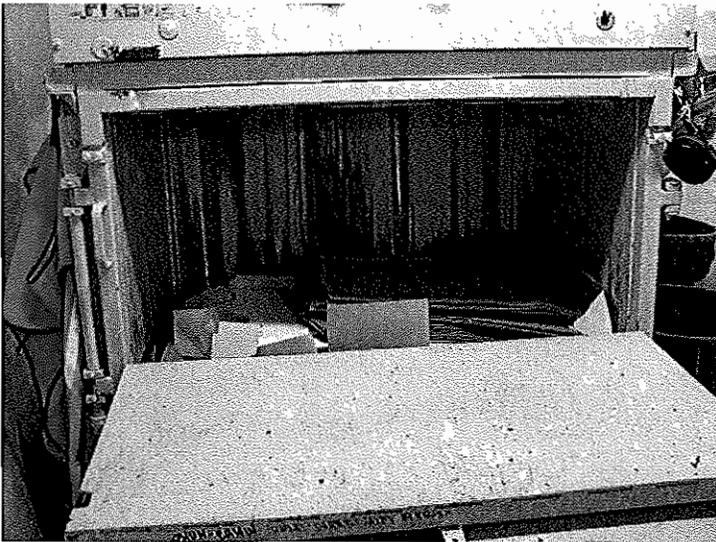


PHOTO #:19 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220099
DESCRIPTION: CARDBOARD COMPACTOR.



PHOTO #:20 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220101
DESCRIPTION: CRUSHED GLASS

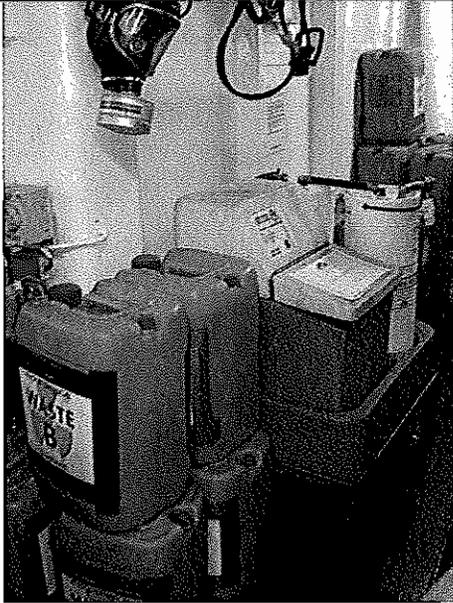


PHOTO #:21 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P6220102
DESCRIPTION: PHOTO WASTE



PHOTO #:22 DATE: JUNE 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P6220103
DESCRIPTION: HAZARDOUS WASTE STORAGE AREA

AMTEST

LABORATORIES

Am Test Inc.
14603 N.E. 87th St.
Redmond, WA 98052
(425) 885-1664

Professional
Analytical
Services

Jul 11 2008
Department of Ecology
3190 160th Ave SE
Bellevue, WA 98008
Attention: Amy Jankowiak

RECEIVED

JUL 16 2008

Dear Amy Jankowiak:

DEPT OF E

Enclosed please find the analytical data for your StarPrincess project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
Starprin-Eff	Water	08-A007512	Micro, CONV, DEM, NUT

Your sample was received on Monday, June 23, 2008. At the time of receipt, the sample was logged in and properly maintained prior to the subsequent analysis.

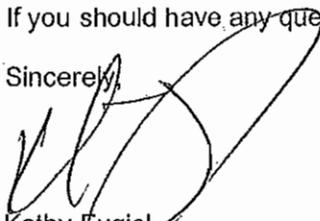
The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Method Detection Limits (MDL's), as opposed to Practical Quantitation Limits (PQL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,


Kathy Fugiel
President

BACT = Bacteriological
CONV = Conventional
TC = Total Coliforms

MET = Metals
ORG = Organics

NUT = Nutrients
DEM = Demand

MIN = Minerals
APC = Aerobic Plate Count

Am Test Inc.
14603 N.E. 87th St.
Redmond, WA 98052
(425) 885-1664
www.amtestlab.com



Professional
Analytical
Services

ANALYSIS REPORT

Department of Ecology
3190 160th Ave SE
Bellevue, WA 98008
Attention: Amy Jankowiak
Project Name: StarPrincess

Date Received: 06/23/08
Date Reported: 7/11/08

RECEIVED

JUL 16 2008

AMTEST Identification Number 08-A007512
Client Identification Starprin-Eff
Sampling Date 06/22/08, 13:23
All results reported on an as received basis.

Microbiological

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fecal Coliforms	< 1	CFU/100 ml		1.	SM 9222D	KF	06/22/08 18:00

Conventionals

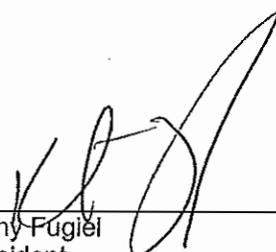
PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	6.70	unit			EPA 150.1	KF	06/22/08
Chlorine Residual	< 0.1	mg/l		0.10	EPA 330.5	KF	06/22/08
Total Suspended Solids	< 1	mg/l		1.0	EPA 160.2	SL	07/01/08

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
BOD	< 10	mg/l		10.	SM 5210B	MRW	06/26/08

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	3.5	mg/l		0.005	EPA 350.1	TS	07/09/08


Kathy Fugiel
President



QC Summary for sample number: 08-A007512

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUPLICATE VALUE	RPD
08-A007274	Ammonia Nitrogen	mg/l	0.25	0.27	7.7
08-A007628	Total Suspended Solids	mg/l	3.0	< 1	
08-A007637	Total Suspended Solids	mg/l	4.0	6.0	40.
08-A007771	Total Suspended Solids	mg/l	6.0	4.0	40.
08-A007781	Total Suspended Solids	mg/l	< 1	1.0	
08-A007930	Total Suspended Solids	mg/l	14.	16.	13.

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
08-A007608	Ammonia Nitrogen	mg/l	< 0.005	0.22	0.25	88.00 %

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
BOD	mg/l	200	150	75.0 %
Chlorine Residual	mg/l	0.50	0.44	88.0 %
Ammonia Nitrogen	mg/l	8.9	10.	112. %
Total Suspended Solids	mg/l	100	100	100. %
Total Suspended Solids	mg/l	100	100	100. %
Total Suspended Solids	mg/l	100	110	110. %
Total Suspended Solids	mg/l	100	90.	90.0 %

BLANKS

ANALYTE	UNITS	RESULT
BOD	mg/l	< 10
Chlorine Residual	mg/l	< 0.1
Ammonia Nitrogen	mg/l	< 0.005
Total Suspended Solids	mg/l	< 1
Total Suspended Solids	mg/l	< 1
Total Suspended Solids	mg/l	< 1
Total Suspended Solids	mg/l	< 1



State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	INFINITY	Date:	July 18, 2008
Vessel Operator:	Celebrity Cruises	Entry Time:	8:58 AM
Vessel Type:	Passenger Ship	Exit Time:	11:20 AM
Location:	Terminal 66, Seattle	Notification (name & date):	Rich Pruitt; July 15, 2008
On-board contact(s):	Ronald Raasch, Environmental Officer; Pantelis Glykas, 2 nd Engineer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	~2270/~950		

The INFINITY arrived on May 9th, 2008 at the Port of Seattle to begin the 2008 cruise season. Zenon (Zeeweed) is a biological reactor and ultrafiltration system. The system includes screening, biological treatment and ultrafiltration via membrane bio-reactors, and ultraviolet light disinfection. Approval for continuous discharge from Ecology has not been requested nor issued. The vessel has been holding effluent and not discharging in MOU waters since the beginning of the season.

Section B: Areas Evaluated

<input checked="" type="checkbox"/>	Black/Gray wastewater system	<input checked="" type="checkbox"/>	Residual solids	<input checked="" type="checkbox"/>	Records/Reports	<input checked="" type="checkbox"/>	Hazardous Waste/Solid Waste	<input type="checkbox"/>	Sampling/Monitoring
<input checked="" type="checkbox"/>	Discharge locations	<input checked="" type="checkbox"/>	Operations & Maintenance	<input checked="" type="checkbox"/>	Sludge Handling/Disposal	<input checked="" type="checkbox"/>	Oily bilge water	<input checked="" type="checkbox"/>	Other

Section C: For vessels discharging ≥ 1 nm from berth and ≥ 6 knots only [2.1.3(A)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	
<input type="checkbox"/>	Operations as described in submitted documentation	
<input type="checkbox"/>	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	
	<u>Turbidity or equivalent</u> : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
<input type="checkbox"/>	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	
<input type="checkbox"/>	Operations as described in submitted documentation	
<input type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring	
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	
	<u>Turbidity or equivalent</u> : Last calibration –	

	Trigger level for early alarm: Recorded turbidity/equivalent levels above triggers:	Trigger level for shutdown:
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	
<input type="checkbox"/>	Disinfection immediately prior to discharge	
<input type="checkbox"/>	Disinfection system operated and maintained properly	
	Disinfection System:	

Section E: General (Approved to Discharge)		
<input type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
<input type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	
<input type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	
<input type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH; chlorine residual)	
<input type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	
<input type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	
<input type="checkbox"/>	Immediate notifications to Health for GI >2% passengers or crew	

Section F: General		
<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Residual solids are typically dewatered, dried and incinerated. If the equipment is not functioning properly, residual solids are held for discharge at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	Hazardous waste is collected is being sent off-shore where appropriate after accumulating for as long as possible. It was reported that no off-loads have occurred since April of 2008. Discharge records were not found readily for review.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	Hazardous waste is collected is being sent off-shore where appropriate after accumulating for as long as possible. It was reported that no off-loads have occurred since April of 2008. Discharge records were not found readily for review.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste appeared to be managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 5 ppm (above and beyond the requirement of 15 ppm) and at greater than 12 nautical miles while traveling at least 6 knots.
Other:		

Health = Washington State Department of Health

Section G: Sample Results		
	Parameter	Results
	Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
	Total Suspended Solids (TSS)	Not Applicable
	Fecal Coliform	Not Applicable
	Residual Chlorine	Not Applicable
	pH	Not Applicable
	Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program conducted the inspection of the Celebrity Cruises INFINITY on July 18, 2008. The main contacts on board the INFINITY included Ronald Raasch, Environmental Officer; and Pantelis Glykas, 2nd Engineer. Prior notification of the visit was given on July 15, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State (MOU)*, as amended. A copy of the current MOU was not available on-board (they had only the original 2004 version). An electronic copy has been sent to the Environmental Officer. The INFINITY has not requested nor has received approval to discharge in MOU waters. The vessel has not been discharging and is holding effluent until outside MOU waters.

The INFINITY was placed into service in 2001, and is 965 feet long with a width of 105 feet.

Inspection

I arrived and boarded the ship (photo #01) at about 8:58 am and began with introductions and a plan for the day with Ronald Raasch, the Environmental Officer. Mr. Raasch is a new Environmental Officer and has been on board for about one month. We then met with Pantelis Glykas, 2nd Engineer and discussed the Zenon advanced wastewater treatment system for black water and gray water. We then discussed food waste and discharge protocols for other waste streams. Discharge records were reviewed for blackwater and graywater discharges. We then viewed the desalinization system, the Zenon system, the Oily Water Separators, the sewage sludge (biomass) dewatering and drying system and the sampling laboratory. Next, we toured the part of the garbage sorting area/food waste extractor and some of the hazardous waste storage. The inspection was then finalized and I disembarked the vessel at about 11:20 am.

Discharge Types and Protocols:

If a discharge is to occur (although not occurring in MOU waters), the Bridge contacts the control room and confirms sea conditions as well as location and also send the information by e-mail. The control room also logs the information. Discharge ports have to manually unlocked for any discharge for double safety. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. All discharge records that were reviewed appeared to be in compliance with the MOU and did not occur in MOU waters.

Blackwater, which includes toilet waste and infirmarium drains and graywater which includes sink and shower water, and laundry water is treated with a Zenon advanced wastewater treatment system and is currently discharged outside of MOU waters. Galley water is collected separately and held for discharge at greater than 12 nautical miles and outside of MOU waters.

Screenings and sewage sludge (biomass) from the Zenon system are dewatered, dried and incinerated. If for some reason, the dewatering and drying process is not functioning, the residual solids are held in a tank for discharge outside of MOU waters., >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool water is discharged overboard almost everyday outside of 12 nautical miles. Spa water is sent to the graywater tank everyday, held and discharged outside of 12 nautical miles.

Food waste is collected in various locations, is sent to the economizing tank, then extracted (photo #28) where the solids are sent to the silo tanks for incineration and the liquid is recycled. Periodically the liquid is wasted, the economizer and the line is drained, the liquid is sent to the grease traps, to the raising unit (photos #03 & #04) and to the galley water holding tanks for discharge outside of 12 nautical miles. A new mixing tank is in place and will be operational soon. With the new mixing tank (photo #18), the Zenon system should be able to handle the galley waste. The collection of the galley waste and separation is overseen by the Environmental Officer and other staff. Grease (cooking oil) is collected and recycled often as biodiesel.

Oily bilge water is treated with an oily water separator and discharged at less than 5 ppm at greater than 12 nautical miles and going 6 knots. There are two Marin Flocc Systems with analyzers. Once per year the analyzers are inspected and certified. A white box is in the process of installation for additional monitoring assurance.

Potable water is bunkered very infrequently, while the majority is produced by desalination. There are two evaporators (photo #02) at approximately 57 cubic meters per hour total. The water is then softened and chlorinated (photos #06 & #07). Reverse Osmosis is on board as a back-up system. A chemical descaler, Ameroyal is used. PH is adjusted before discharging.

Air conditioning condensate is held and used as technical water.

Dry cleaning currently uses Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste (photo #29). Medical waste and expired medications are incinerated at Sea (with witnesses). Medical sharps are collected and off-loaded on shore with hazardous waste.

Other hazardous wastes include batteries, fluorescent bulb waste (after going through a mercury recovery system, thinners and paint waste). The hazardous wastes are stored for as long as possible to minimize the number of off-loads. The Environmental Officer reported that the last hazardous off-load was in April 2008. The records were not readily available.

Silver is captured from the photo waste treated through a silver recovery system and held until off-loaded in a location that accepts it as non-hazardous waste. X-ray waste is collected and combined with photo waste. Materials recycled include cardboard, paper, plastics, aluminum, tin, scrap metal, batteries, electronics, cooling oil and crushed glass.

Black water and Gray water System:

The advanced wastewater treatment system, Zenon, consists of two separate membrane bioreactors. Black water, which includes toilet waste and infirmary drains is collected by vacuum to black water collection tanks (photo #17). Gray water, which includes sink and shower water, and laundry water is collected to gray water collection tanks. The gray water (photo #05) and black water (photo #14) then combine just as they enter the screening units (2 units) (photo #15). The screening units are flushed with hot water about every two hours. Solids from the screening unit first go to the wasting transfer tank (photo #16) and then onto the sludge tank where they eventually go through a dewatering unit (polymers added) and driers prior to incineration (photos #23, #24 & #25). Return from the dewatering unit goes back to the black water tank for treatment again.

The liquid from the screening units moves to the bioreactors (photo #08). The bioreactors have a capacity of about 1,000 cubic meters per day. The MBRs use air by both oxygen generators (photo #11) and blowers. The membrane bioreactors are cleaned automatically about once a day and chlorine or an acid are sometimes used for a more thorough cleaning (photo #13). The cleaning can be done manually as well. About once a year, a complete empty and clean is called for. Solids that are wasted from the MBRs periodically are sent to the wasting transfer tank. Effluent from the MBRs is combined and sent to the ultraviolet disinfection unit (UV 18) (photos #20 & #22). After UV, the effluent is sent to (photo #12) permeate holding tanks (6) if not in an area for discharge. When discharging, effluent from the holding tanks goes through another UV system (UV20) (photos #19 & #21) prior to discharge. The UV systems have lighted alarms when bulbs go out and alarms for intensity and overheating. The sleeves are cleaned with a chemical by hand wipe at least twice per year. There are both spare bulbs and sleeves on board.

Sampling is done on board (photos #26 & #27) the vessel twice weekly. Parameters include total suspended solids, chemical oxygen demand, ammonia, chlorine and total coliform. There are plans to also test biochemical oxygen demand on board as well. Total suspended solids are tested daily in order to decide how much to waste. There are turbidity meters on each bioreactor, after the back pulse before UV, and after UV20. The highest turbidity seen has been about 1.0 NTU.

Zenon representatives will be on board the vessel soon to help with bringing on line a new mixing tank. The new mixing tank is already in place (modified an old tank). The new mixing tank should help provide more consistency in waste once the black water and gray water are combined. The tank should also allow galley water to go through the Zenon system.

The INFINITY has been able to keep their old treatment system (Hamann) onboard, which could be used if there was a problem with the Zenon system and then discharged outside of MOU waters.

Conclusions and Recommendations

The laboratory testing on-board is an excellent way to monitor and make needed adjustments to the system. Having a laboratory on-board for the testing is ideal.

It is recommended that staff continue to work towards a high functioning wastewater treatment system.

Attachments:

Photographs

Copies to:

Rich Pruitt, RCCL
Ronald Raasch, Environmental Officer
Amy Jankowiak, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology

Central Files: Celebrity Cruises – INFINITY; WQ 6.1

Section I: Signatures

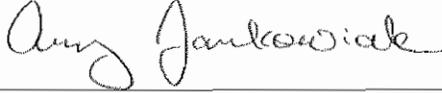
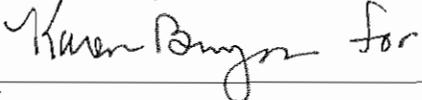
<u>Name and Signature of Inspector</u>	<u>Agency/Office/Telephone</u>	<u>Date</u>
Amy Jankowiak 	Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	8/14/08
Kevin C. Fitzpatrick 	Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	8/15/08



PHOTO #:01 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P7180030
DESCRIPTION: INFINITY VESSEL, SEATTLE

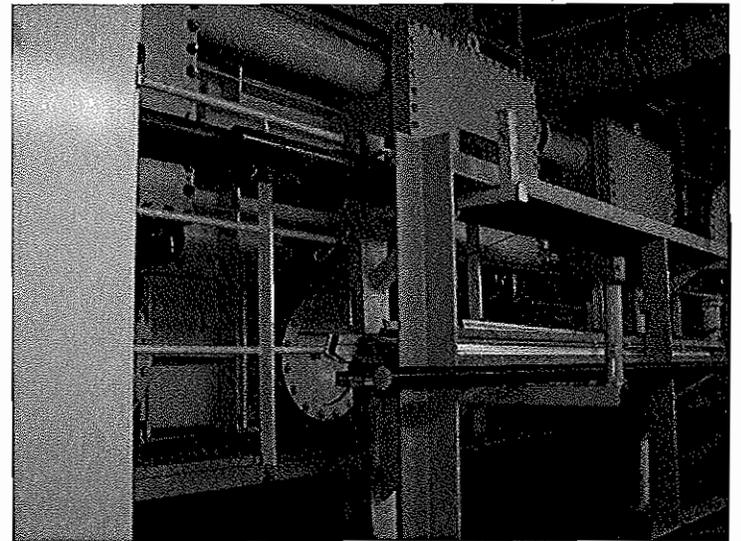


PHOTO #:02 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180001
DESCRIPTION: DESALINIZATION EVAPORATOR

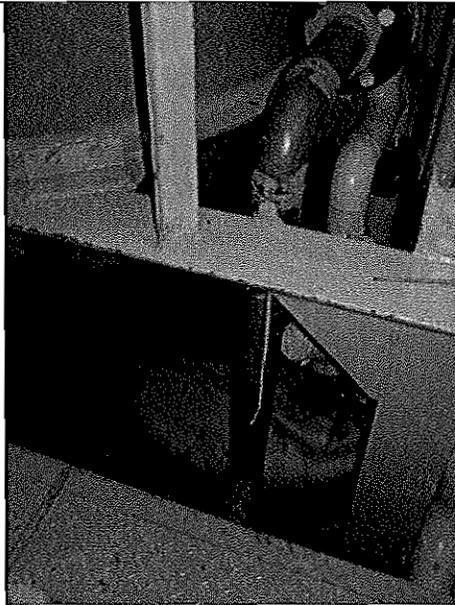


PHOTO #:03 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180002
DESCRIPTION: RAISING/GREASE TRAP

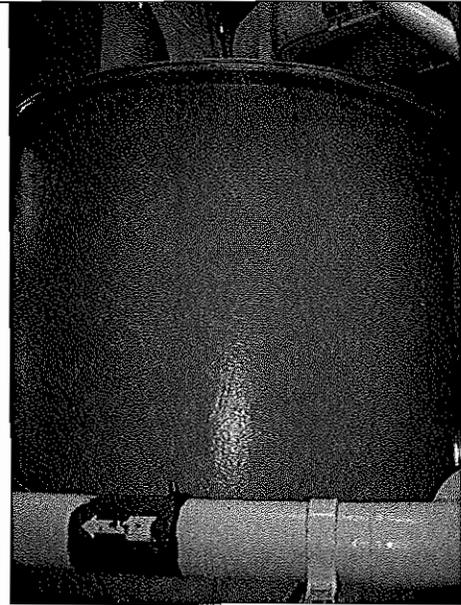


PHOTO #:04 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180003
DESCRIPTION: GREASE TRAP

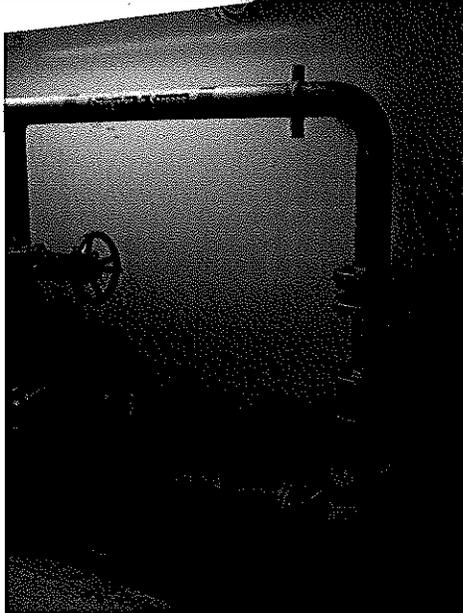


PHOTO #:05 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180005
DESCRIPTION: GRAY WATER TO SCREENS

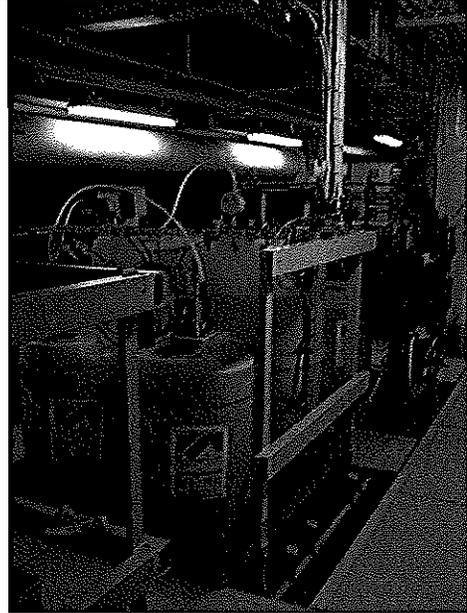


PHOTO #:06 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180006
DESCRIPTION: POTABLE WATER CHEMICALS

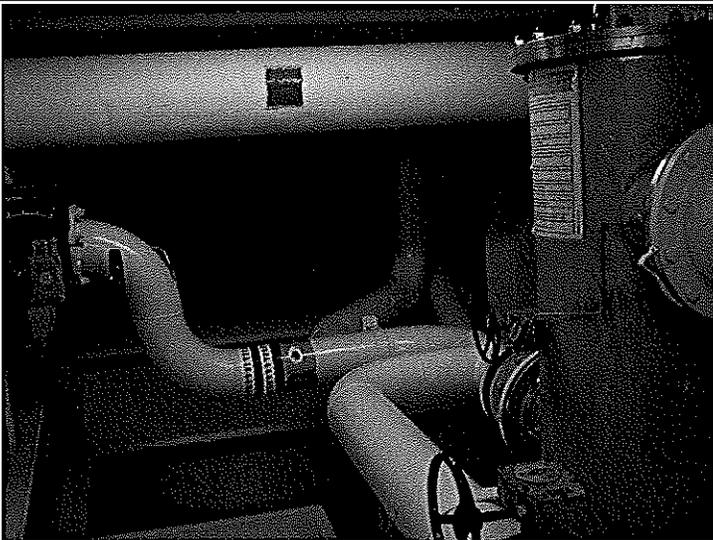


PHOTO #:07 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180007
DESCRIPTION: POTABLE WATER FILTER AND CHLORINE FEED



PHOTO #:08 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180008
DESCRIPTION: MEMBRANE TANK (1 OF 2 MBRs)



PHOTO #:09 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P7180009
DESCRIPTION: AIR HOLD TANKS FOR OXYGEN UNIT

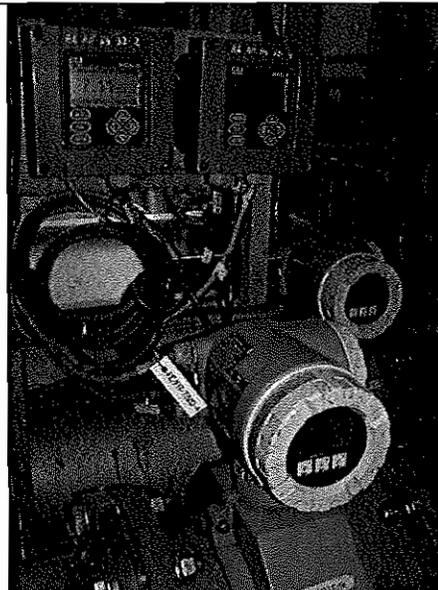


PHOTO #:10 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180010
DESCRIPTION: ZENON PH AND FLOW SENSORS

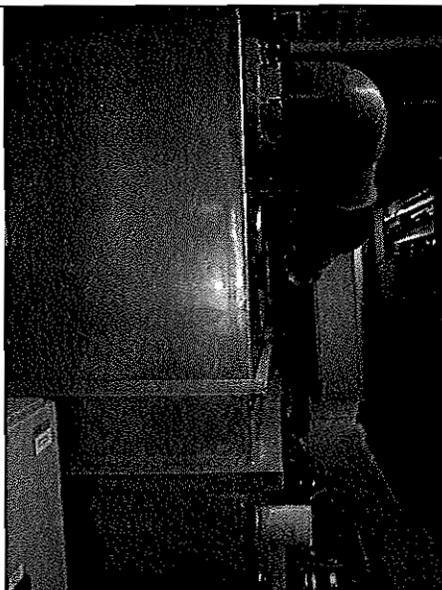


PHOTO #:11 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180011
DESCRIPTION: ZENON BACKPULSE TANKS (LEFT)

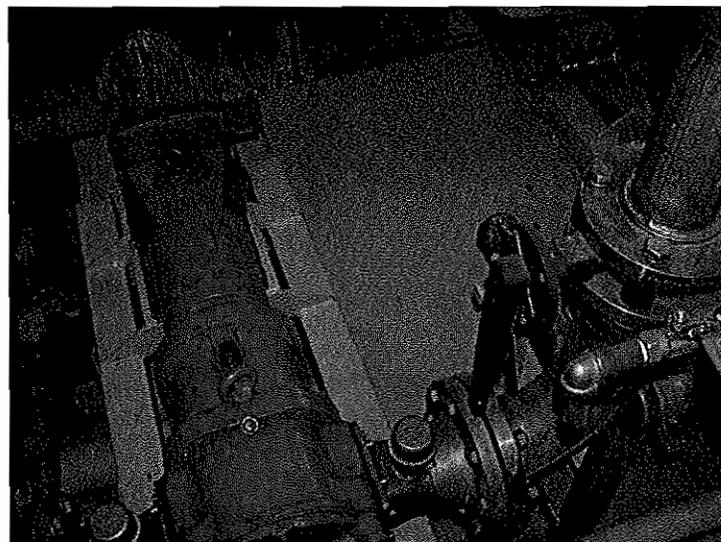


PHOTO #:12 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180012
DESCRIPTION: PERMEATE PUMPS

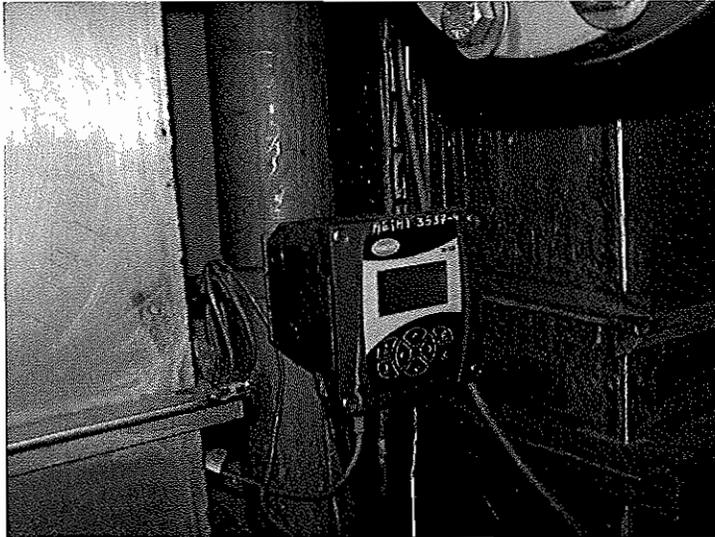


PHOTO #:13 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P7180013
DESCRIPTION: TURBIDITY METER (1 OF 2) ON BACKPULSE TANKS

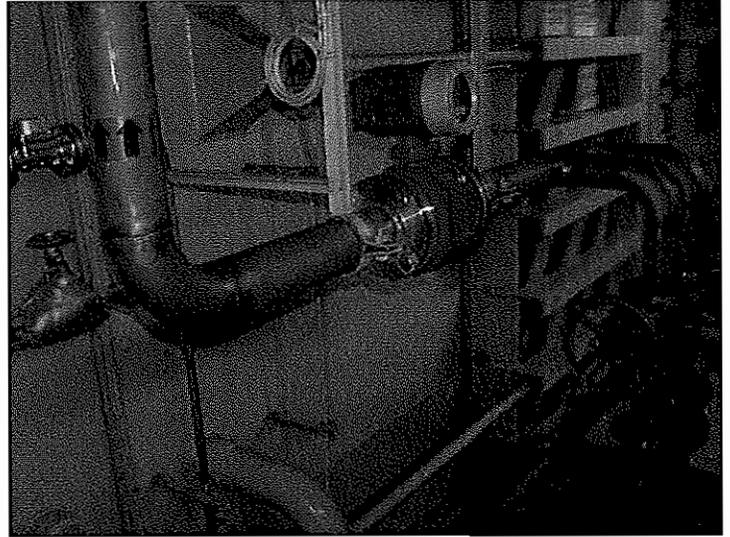


PHOTO #:14 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180014
DESCRIPTION: BLACK WATER TO SCREENS

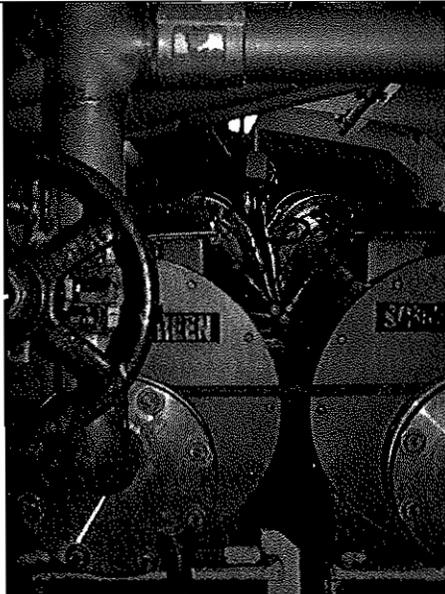


PHOTO #:15 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180015
DESCRIPTION: SCREENS

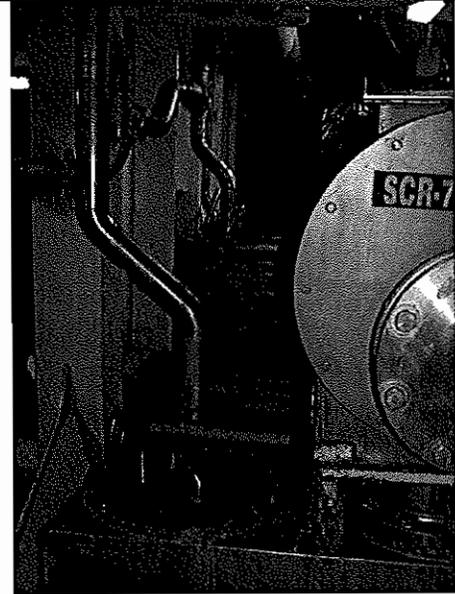


PHOTO #:16 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180016
DESCRIPTION: WASTING TRANSFER TANK (LEFT OF SCREEN)

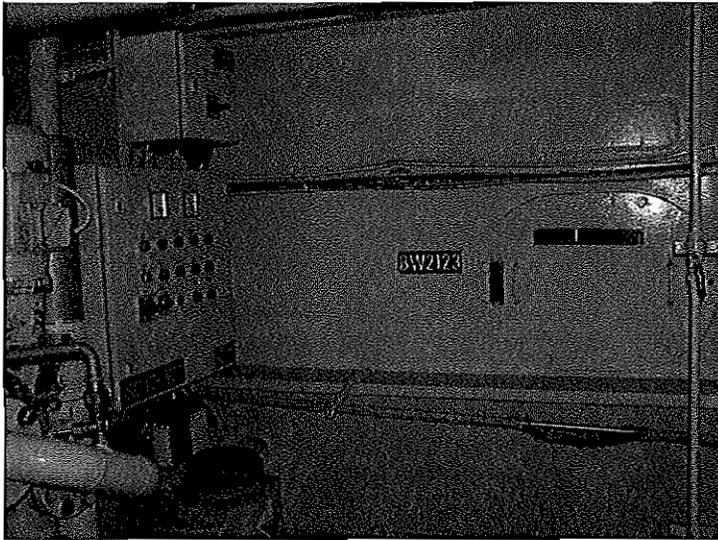


PHOTO #:17 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P7180017
DESCRIPTION: BLACKWATER HOLDING TANK

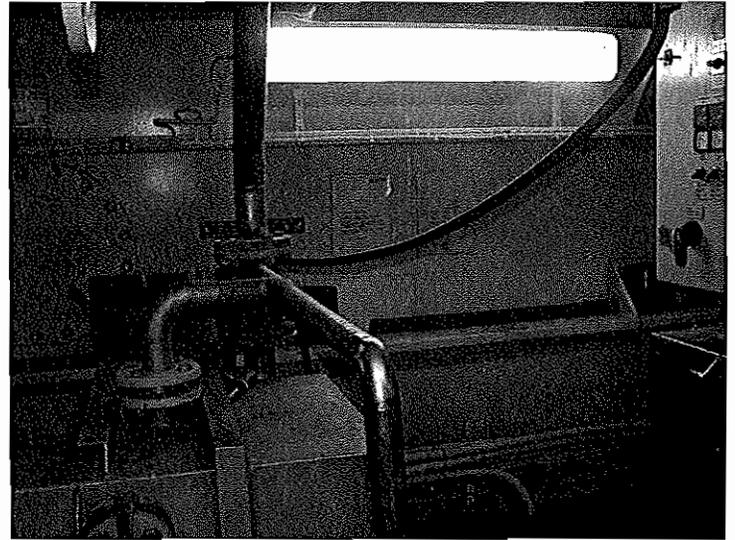


PHOTO #:18 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180018
DESCRIPTION: NEW MIXING TANK

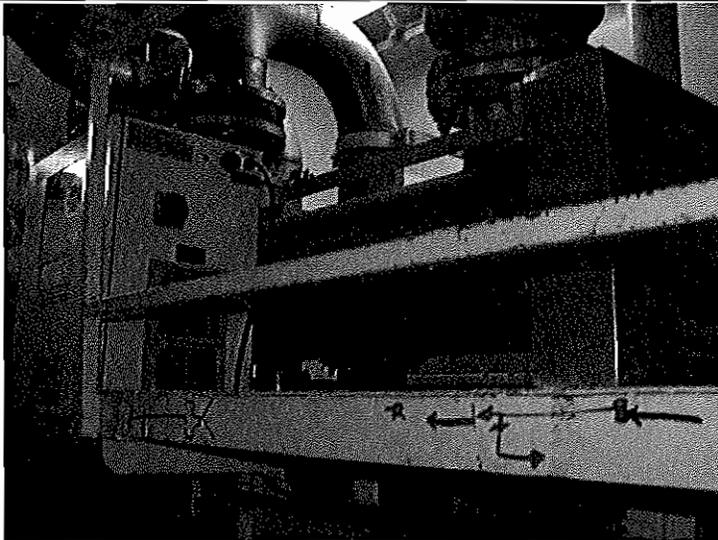


PHOTO #:19 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180019
DESCRIPTION: ULTRAVIOLET (UV) DISINFECTION SYSTEM UV20
FOR DISCHARGE AFTER EFFLUENT IN HOLDING TANK

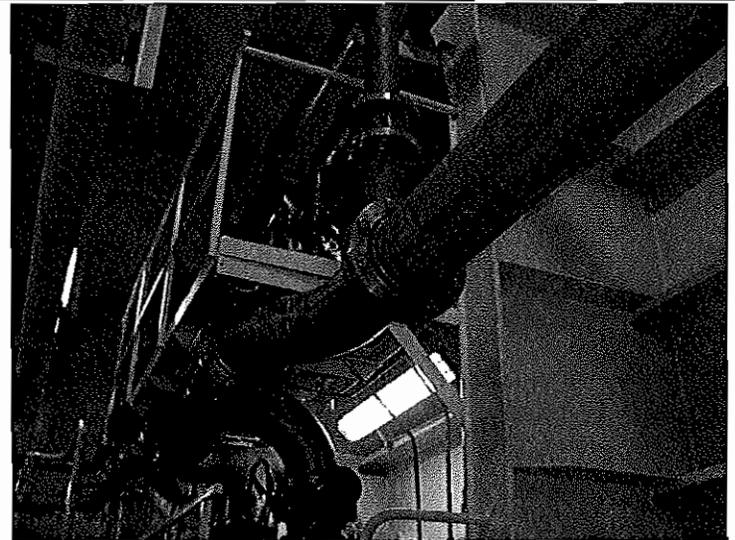


PHOTO #:20 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180020
DESCRIPTION: UV18 FOR DISCHARGE IMMEDIATELY AFTER
TREATMENT

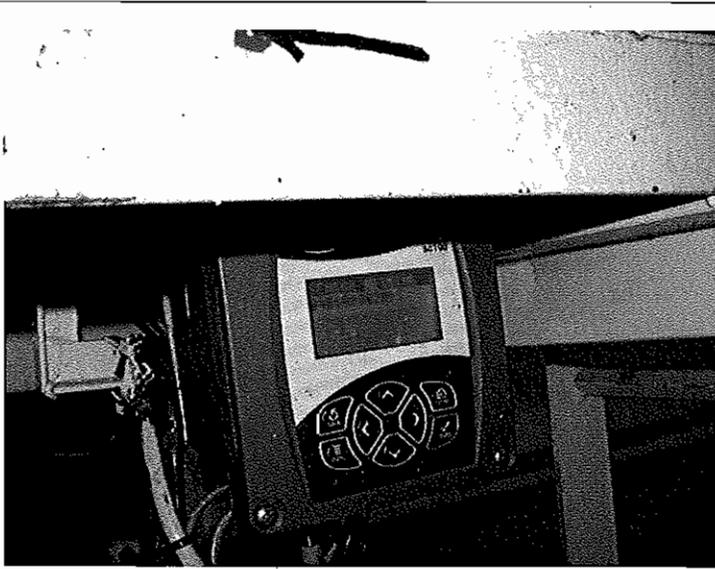


PHOTO #:21 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P7180021
DESCRIPTION: TURBIDITY METER FOR UV20



PHOTO #:22 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180022
DESCRIPTION: CONTROL PANEL FOR UV18



PHOTO #:23 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180023
DESCRIPTION: SLUDGE TANK TO DEWATER UNITS (A&B)



PHOTO #:24 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180024
DESCRIPTION: MJORUD SLUDGE COLLECTION TANK

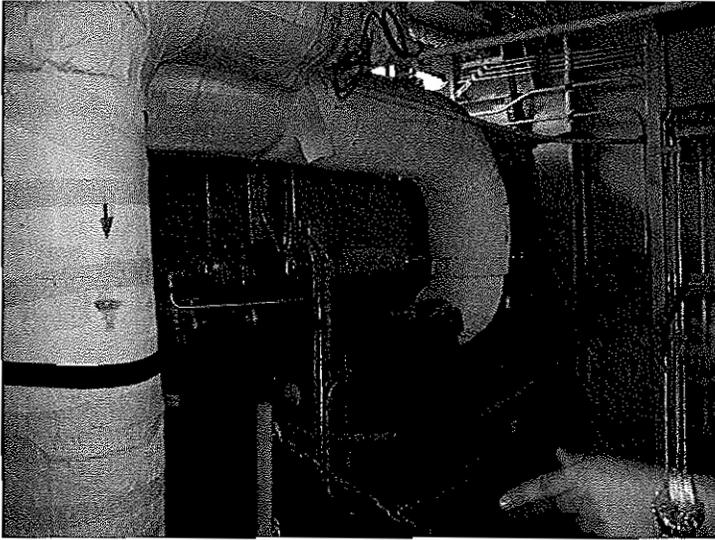


PHOTO #:25 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P7180025
DESCRIPTION: MJORUD DRYER

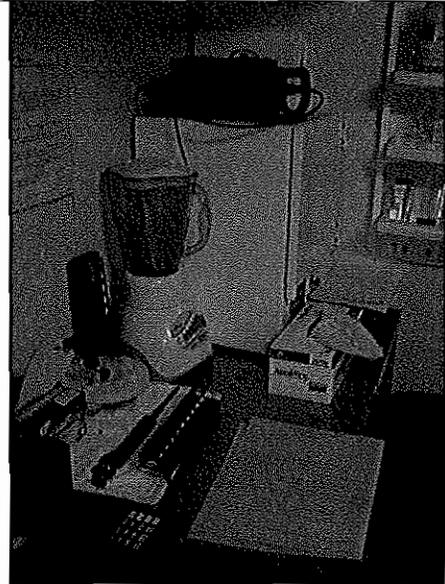


PHOTO #:26 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180026
DESCRIPTION: SAMPLING LABORATORY

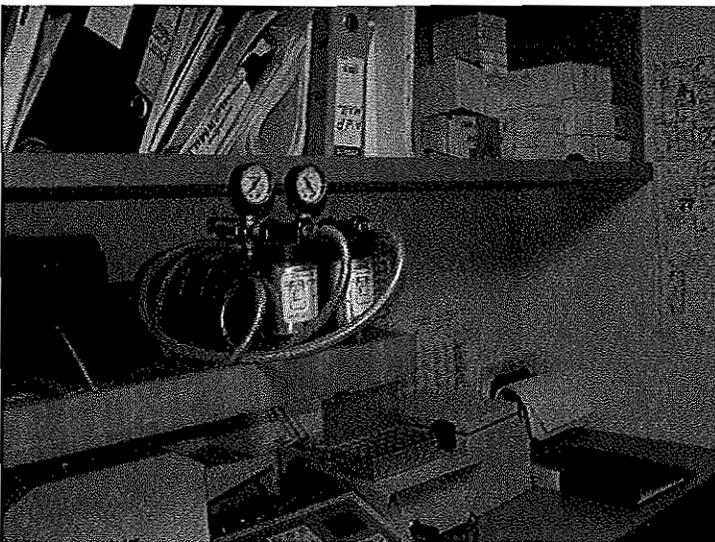


PHOTO #:27 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180027
DESCRIPTION: SAMPLING LABORATORY

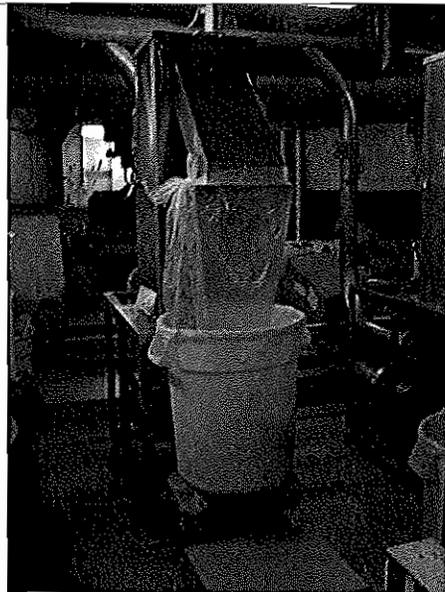


PHOTO #:28 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P7180029
DESCRIPTION: FOOD WASTE EXTRACTOR

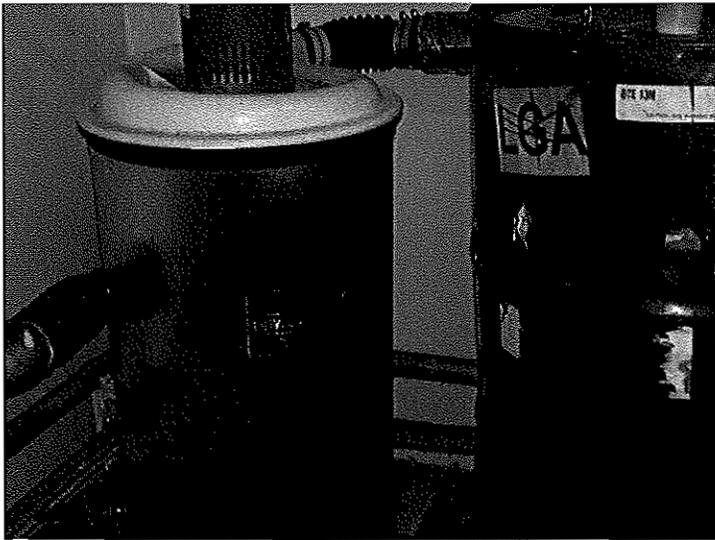
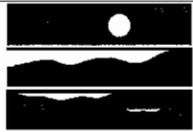


PHOTO #:29 DATE: JULY 18, 2008
TAKEN BY: AMY JANKOWIAK . FILE No.:P7180029
DESCRIPTION: PERC STORAGE



State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	GOLDEN PRINCESS	Date:	July 26, 2008
Vessel Operator:	Princess Cruises	Entry Time:	9:02 AM
Vessel Type:	Passenger Ship	Exit Time:	11:25 AM
Location:	Pier 30, Seattle	Notification (name & date):	A. Lorenzano and D. Hutchinson on July 22, 2008
On-board contact(s):	Markus Valerio, Environmental Officer; Pietro Donato, Staff Engineer, Nick Nash, Captain		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program; Karen Burgess, Department of Ecology, Water Quality Program; and Mark Toy, Department of Health		
# passengers/crew:	~2800/~1100		
<p>The GOLDEN PRINCESS arrived on May 10th, 2008 at the Port of Seattle to begin the 2008 cruise season. Hamworthy is a biological reactor and ultrafiltration system. The system includes screening via a screen press, biological treatment via bio-reactors with inter-stage filters and a membrane system, and ultraviolet light disinfection. Approval for continuous discharge from Ecology was granted on May 12, 2008, however, the vessel has been holding effluent and not discharging in MOU waters since the beginning of the season.</p>			

Section B: Areas Evaluated

<input checked="" type="checkbox"/>	Black/Gray wastewater system	<input checked="" type="checkbox"/>	Residual solids	<input checked="" type="checkbox"/>	Records/Reports	<input checked="" type="checkbox"/>	Hazardous Waste/Solid Waste	<input checked="" type="checkbox"/>	Sampling/Monitoring
<input checked="" type="checkbox"/>	Discharge locations	<input checked="" type="checkbox"/>	Operations & Maintenance	<input checked="" type="checkbox"/>	Sludge Handling/Disposal	<input checked="" type="checkbox"/>	Oily bilge water	<input checked="" type="checkbox"/>	Other

Section C: For vessels discharging ≥ 1 nm from berth and ≥ 6 knots only [2.1.3(A)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	
<input type="checkbox"/>	Operations as described in submitted documentation	
<input type="checkbox"/>	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	
	<u>Turbidity or equivalent</u> :	
	Last calibration –	
	Trigger level for early alarm:	Trigger level for shutdown:
	Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
<input type="checkbox"/>	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

<input checked="" type="checkbox"/>	Schematics match black/gray wastewater system	Schematics appeared to be consistent with they system on board.
<input checked="" type="checkbox"/>	Operations as described in submitted documentation	Operations were as described.
<input checked="" type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring	Continuous turbidity for monitoring. There are turbidity meters on each of the three MBR permeate tanks.
<input checked="" type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Appears to be functioning properly.
	<u>Turbidity or equivalent</u> :	

	Last calibration – Maintenance program triggers need for calibration Not recommended by manufacturer's instruction book Trigger level for early alarm: none Trigger level for shutdown: 25 NTU Recorded turbidity/equivalent levels above triggers:	
<input checked="" type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	A value of 25 NTU or greater triggers automatic shut down of that MBR.
<input checked="" type="checkbox"/>	Disinfection immediately prior to discharge	Protocol: When discharging, UV occurs immediately prior to discharge.
<input checked="" type="checkbox"/>	Disinfection system operated and maintained properly	The UV system appeared to be operational and maintained well.
	Disinfection System: The disinfection system is with an ultraviolet light system with 6 bulbs that are alarmed for bulb failure and high temperature. Intensity is also monitored. The bulbs are cleaned automatically with wipers more than once a day. There is one spare bulb on board, with more ordered (just replaced some).	

Section E: General (Approved to Discharge)

<input checked="" type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tye Shoal)	No discharges are currently occurring within Waters subject to the MOU per company protocol.
<input checked="" type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	No discharges are currently occurring within Waters subject to the MOU. They do have their systems set up to automatically shut down the discharge if high turbidity occurs.
<input checked="" type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	No discharges are currently occurring within Waters subject to the MOU.
<input checked="" type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted as required, as of the date of the inspection.
<input checked="" type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	WET testing is required this season for the GOLDEN PRINCESS
<input checked="" type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols should be in place.
<input checked="" type="checkbox"/>	Immediate notifications to Health for GI >2% passengers or crew	No discharges are currently occurring within Waters subject to the MOU. Protocols should be in place.

Section F: General

<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Residual solids are either incinerated or held to be discharged at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.

Other:

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	<10 mg/l
Total Suspended Solids (TSS)	3 mg/l
Fecal Coliform	1 CFU/100 ml
Residual Chlorine	4.61 mg/l
pH	6.95 unit
Ammonia, Nitrogen	38 mg/l

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program (NWRO-WQ) along with Karen Burgess, Ecology, NWRO-WQ, and Mark Toy, Washington State Department of Health, Office of Shellfish and Water Protection conducted the inspection of the Princess Cruises GOLDEN PRINCESS on July 26, 2008. The main contacts on board the GOLDEN PRINCESS included Markus Valerio, Environmental Officer; Pietro Donato, Staff Engineer, Nick Nash, Captain. Prior notification of the visit was given on July 22, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. A copy of the current MOU was on-board. The GOLDEN PRINCESS received approval to discharge continuously on May 12, 2008. The vessel has not been discharging and is holding effluent until outside MOU waters.

The GOLDEN PRINCESS was placed into service in 2001, and is 951 feet long with a width of 118 feet.

Inspection

We arrived and boarded the ship at about 9:02 am and began with introductions and a plan for the day with Markus Valerio, the Environmental Officer and with Nick Nash, Captain. We then headed to the Engine Control Room (ECR) and discussed various waste streams, and the discharge protocols. Discharge records were reviewed for blackwater and graywater discharges and hazardous waste off-loads. We then discussed the blackwater and graywater system in detail. Next, we viewed the garbage sorting area and hazardous waste storage. We then took samples of the Hamworthy effluent and toured the Hamworthy system and oily water separator. The inspection was then finalized with a debriefing and we disembarked the vessel at about 11:25 am.

Discharge Types and Protocols:

If a discharge is allowed, the Bridge authorizes any discharge. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. All discharge records that were reviewed appeared to be in compliance with the MOU and also did not occur in MOU waters.

Blackwater, which includes toilet waste and graywater which includes sink and shower water is treated with a Hamworthy advanced wastewater treatment system and is currently discharged outside of MOU waters. Laundry water and galley water is collected separately and held for discharge outside of MOU waters.

Medical blackwater is sent to evac #4, and in case of emergency, will be isolated by valve.

Screenings and grit from the Hamworthy system are collected and incinerated. The solids separated out by the bioreactors is discharged outside of MOU waters, >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool and spa water is discharged outside of 12 nautical miles.

Food waste is collected in various locations, is sent through a pulper. The water is recirculated and eventually held and discharged outside of MOU waters. The solid food material from the pulpers is incinerated. Grease, or cooking oil (photo #03) is collected and recycled for biodiesel in Seattle.

Oily bilge water is treated with an oily water separator (photo #16) and discharged at less than 15 ppm after first going through a white box for monitoring.

Potable water is bunkered now and then, while the rest is produced by desalination. Evaporators are used to generate water with a VAPTREATMENT system. The water then goes to the UV lama and true mineralizaer and is chlorinated before going to a storage tank. Salt collected from the evaporators is sent back to the sea.

Dry cleaning uses a solvent called Soff' N Brite, a delicate wetcleaning detergent. Other hazardous wastes include batteries, bulbs (no crusher on board), paints, oily rags, sludge oil, aerosols (punctured), and sharps. Silver is captured from the photo waste (photo #04), treated to less than 5 ppm and is incinerated. Medical waste that is not hazardous is collected and incinerated. Hazardous medical waste, including sharps is off-loaded with hazardous waste in Victoria. All hazardous waste (photo #02) is off-loaded in Victoria. Expired medications are logged and sent ashore to be sent back to England. X-ray's are done digitally, and therefore there is no x-ray waste. Other materials incinerated (photo #06) include paper, cartons, some plastics, and sludge.

Plastics, garbage (photo #01), and other materials are collected and sorted on a sorting table (photo #05). Most materials

are then condensed and recycled on-shore. Some cardboard is collected and off-loaded for recycling. Glass, aluminum, tin, and plastics are all recycled along with other materials.

Black water and Gray water System:

The Hamworthy system consists of three separate membrane bioreactors (MBRs). Black water, which includes toilet waste is collected by vacuum to one of five collection tanks and then combines with gray water which includes sink and shower water and has been piped to a buffer tank. Combined gray and black water flow moves to the screen press (photo #09). The solids are screened into bags (photos #10 and #11) and are then sent to the incinerator. The liquid moves to the 1st stage of the membrane bioreactor where aeration occurs. From the 1st stage, flow moves to the Russell Filters (inter-stage filters – photo #14). The inter-stage filtered solids are returned back to the screen press. The liquid moves onto the 2nd stage of the MBR for further aeration. From the 2nd stage MBR, flow is sent to the membrane modules for ultrafiltration (photo #15). There are 16 membranes with each MBR system which are cleaned in a washing tank with chemicals. Solids from the filters are collected and incinerated. Effluent from the membrane modules are sent to a permeate tank (photo #12) where turbidity is monitored. Flow then combines with the other two MBR's at the Ultraviolet (UV) Light Permeate tank. From the UV Permeate tank, effluent moves through the ultraviolet (UV) disinfection system (photo #08). Disinfected effluent either goes directly overboard or to a holding tank if not in an approved area for discharge. Currently, effluent is held and discharged outside of MOU waters.

Turbidity is measured continuously on each of the MBR permeate tanks (photo #13). At the time of the inspection, the MR's were at 3.9, 1.5 and 2.8. The meters are alarmed and shutdown at 25 NTU maximum. The UV system consists of 6 bulbs which are alarmed for bulb failure and high temperature. Intensity is also monitored (photo #07). The UV sleeves are automatically cleaned by wiper more than once a day. There is one spare on board with more on order as they just replaced some of the bulbs.

Staff regularly communicate with Hamworthy representatives. The staff have a small laboratory on board where they sample for such parameters as coliform, total suspended solids (TSS), chemical oxygen demand (COD), free and total chlorine, and pH, which are monitored on board about twice a week. The on-board sampling allows for immediate results and a chance for immediate corrections to the system.

Samples were taken for Biochemical Oxygen Demand (BOD 5-Day), Total Suspended Solids (TSS), pH, chlorine residual, fecal coliform and ammonia from the combined effluent of the MBR's after UV disinfection. The sample port was cleaned prior to pulling samples. The samples were put on ice immediately and were transported to AmTest laboratory in Redmond, Washington that afternoon. Chain of Custody and sampling procedures were followed. All results are in Section F. The results are typical of the results submitted to Ecology thus far for 2008.

Conclusions and Recommendations

It is recommended that staff continue to work towards high functioning wastewater treatment systems.

The laboratory testing on-board is an excellent way to monitor and make needed adjustments to the system. Having a laboratory on-board for the testing is ideal.

Whole Effluent Toxicity (WET) testing is required this season for the GOLDEN PRINCESS. Please follow the requirements of the MOU for WET testing as well as the Guidelines included on our website under the "Sampling" header.
http://www.ecy.wa.gov/programs/wq/wastewater/cruise_mou/index.html.

Attachments:

Photographs
Laboratory Report

Copies to:

Andrew Lorenzana, Princess Cruises
Markus Valerio, Environmental Officer
Amy Jankowiak, Ecology
Karen Burgess, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Princess Cruises – GOLDEN PRINCESS; WQ 6.1

Section I: Signatures

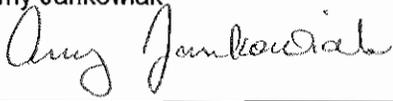
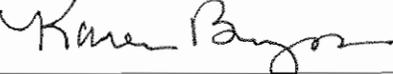
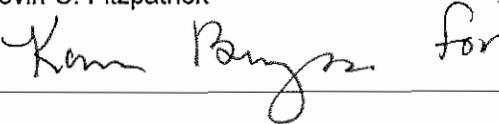
<u>Name and Signature of Inspector</u>	<u>Agency/Office/Telephone</u>	<u>Date</u>
Amy Jankowiak 	Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	8/14/08
Name and Signature of Reviewer Karen Burgess 	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7207	8/15/08
Name and Signature of Reviewer Kevin C. Fitzpatrick 	Agency/Office/Telephone Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	8/15/08



PHOTO #:01 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.:P7260002
DESCRIPTION: GARBAGE TO BE SORTED



PHOTO #:02 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260003
DESCRIPTION: HAZARDOUS WASTE STORAGE



PHOTO #:03 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260004
DESCRIPTION: COOKING OIL CONTAINERS (SQUARE IN BACK)

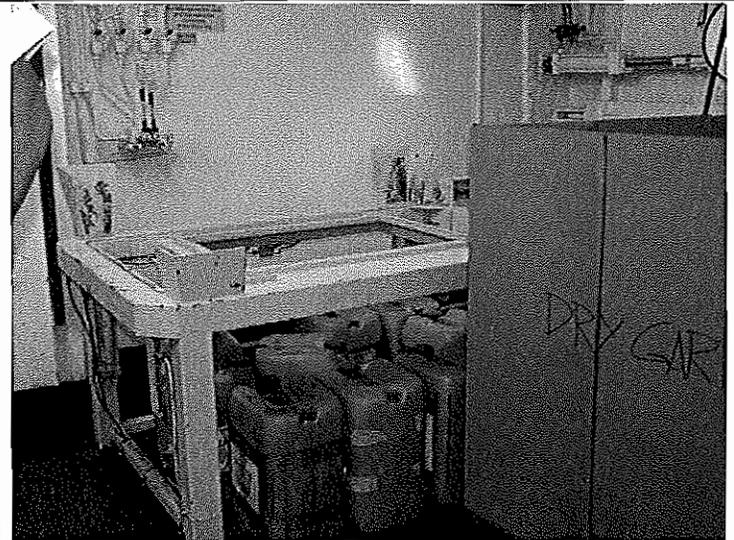


PHOTO #:04 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260005
DESCRIPTION: PHOTO WASTE STORAGE AREA



PHOTO #:05 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.:P7260006
DESCRIPTION: WASTE SORTING AREA

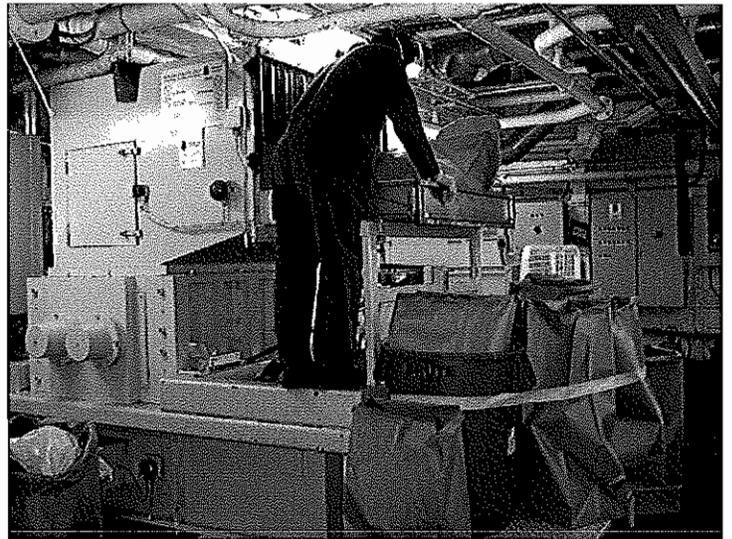


PHOTO #:06 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260008
DESCRIPTION: MATERIALS BE SHREDDED FOR INCINERATION



PHOTO #:07 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260009
DESCRIPTION: HAMWORTHY ULTRAVIOLET LIGHT (UV)
DISINFECTION SYSTEM CONTROL PANAL

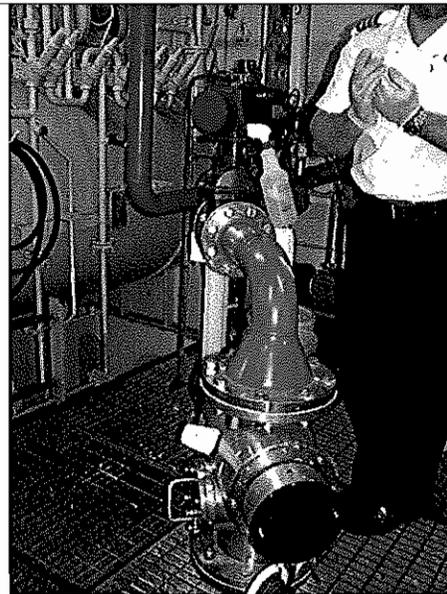


PHOTO #:08 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260010
DESCRIPTION: UV DISINFECTION SYSTEM AND SAMPLE PORT

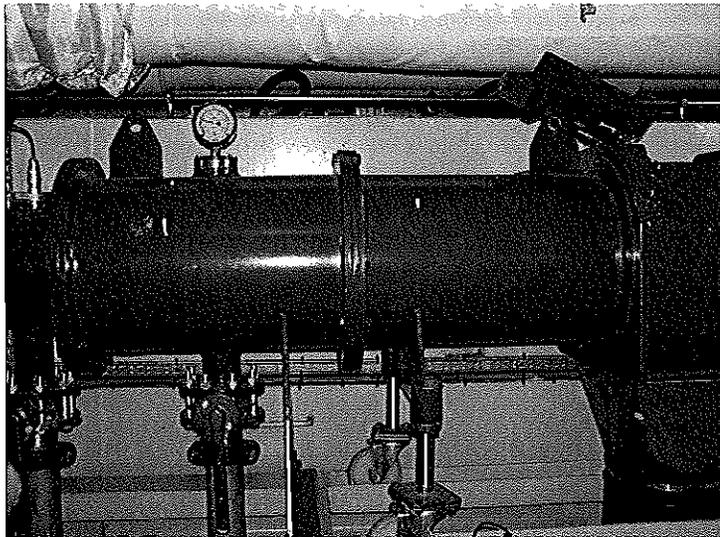


PHOTO #:09 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.:P7260011
DESCRIPTION: SCREEN PRESS



PHOTO #:10 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260013
DESCRIPTION: SCREEN PRESS SCREENINGS



PHOTO #:11 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260014
DESCRIPTION: SCREEN PRESS SCREENINGS (TO INCINERATION)

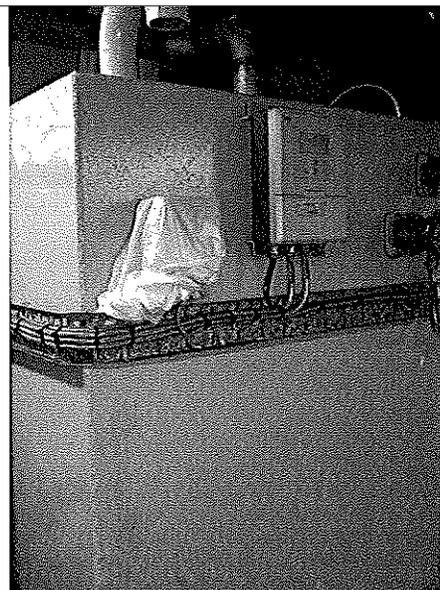


PHOTO #:12 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260015
DESCRIPTION: MBR PERMEATE TANK

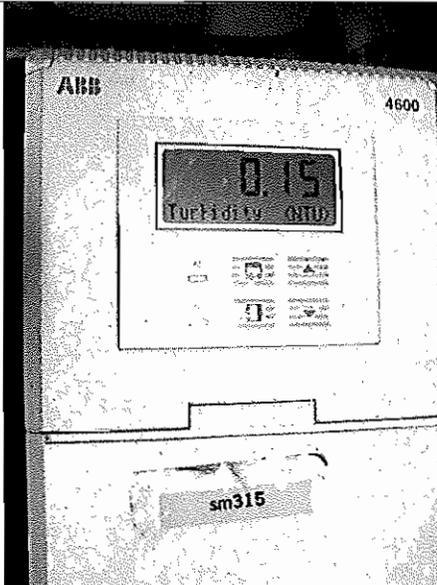


PHOTO #:13 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.:P7260016
DESCRIPTION: TURBIDITY ON PERMEATE TANK

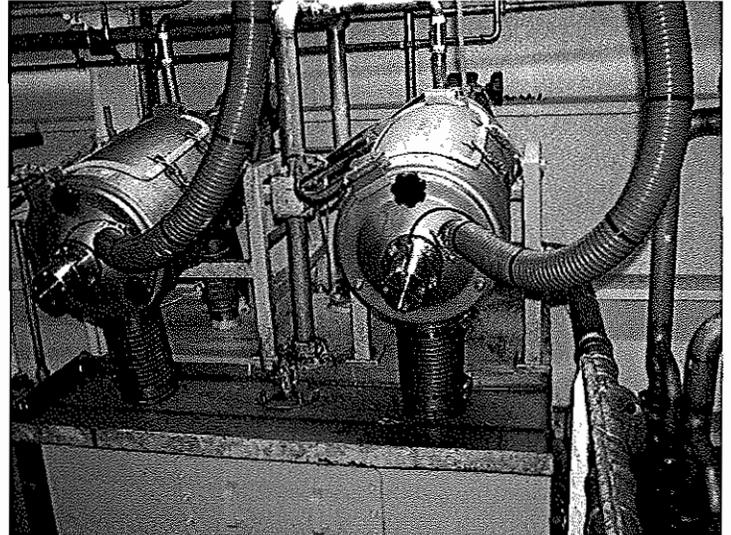


PHOTO #:14 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260017
DESCRIPTION: RUSSELL FILTERS (INTERSTAGE FILTERS)

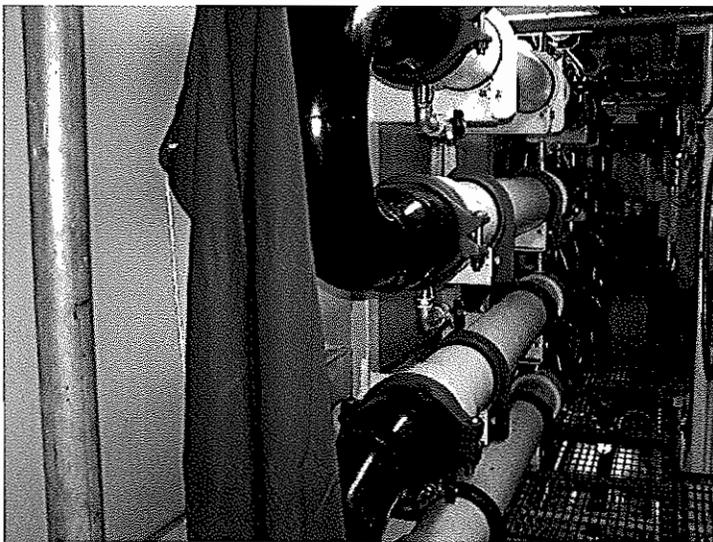


PHOTO #:15 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260018
DESCRIPTION: MEMBRANES (IN FRON OF BIOREACTOR TANKS)

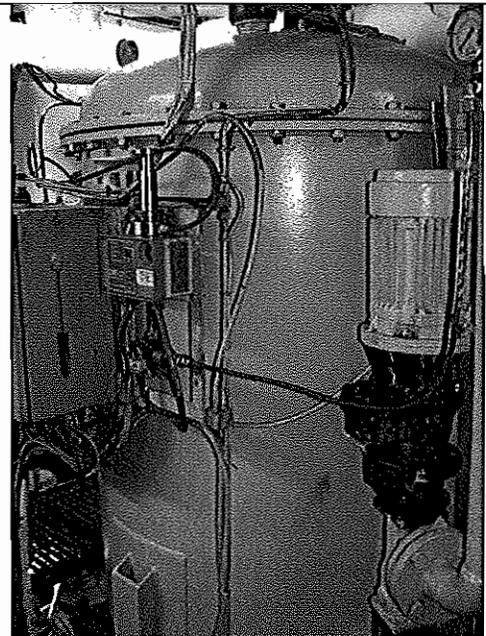


PHOTO #:16 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260019
DESCRIPTION: OILY WATER SEPARATOR

AMTEST Identification Number 08-A009613
Client Identification GOLPRIN-EFF
Sampling Date 07/26/08, 10:45

Microbiological

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fecal Coliforms	1.	CFU/100 ml		1.	SM 9222D	NG	07/26/08 17:00

Conventionals

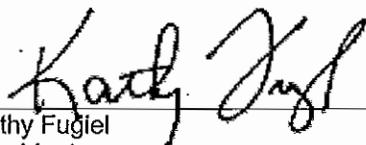
PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	6.95	unit			EPA 150.1	NG	07/26/08
Chlorine Residual	4.61	mg/l		0.10	EPA 330.5	AY	07/26/08
Total Suspended Solids	3.0	mg/l		1.0	SM 2540D	SL	07/29/08

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
BOD	< 10	mg/l		10.	SM 5210B	NG	07/26/08

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	38.	mg/l		0.005	EPA 350.1	TS	08/07/08


Kathy Fugiel
President





State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	NORWEGIAN STAR	Date:	July 26, 2008
Vessel Operator:	NCL (Bahamas) Ltd.	Entry Time:	12:40 PM
Vessel Type	Passenger Ship	Exit Time:	2:27 PM
Location:	Terminal 66, Seattle	Notification (name & date):	Randy Fiebrandt on July 22, 2008
On-board contact(s):	Davor Baletin, Environmental Officer, Joebert Orrica, Environmental Engineer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program; Karen Burgess, Department of Ecology, Water Quality Program; and Mark Toy, Department of Health		
# passengers/crew:	~2700/~1100		
<p>The NORWEGIAN STAR arrived on May 3, 2008 at the Port of Seattle to begin the 2008 cruise season. Scanship is a biological reactor and ultrafiltration system. The system includes prefiltration, biological treatment via a biofilm process, chemical precipitation, clarification through flotation tanks, polishing filtration and UV disinfection. Approval for continuous discharge from Ecology was granted in 2004, 2005, 2006, 2007 and May 12, 2008.</p>			

Section B: Areas Evaluated

<input checked="" type="checkbox"/>	Black/Gray wastewater system	<input checked="" type="checkbox"/>	Residual solids	<input checked="" type="checkbox"/>	Records/Reports	<input checked="" type="checkbox"/>	Hazardous Waste/Solid Waste	<input checked="" type="checkbox"/>	Sampling/Monitoring
<input checked="" type="checkbox"/>	Discharge locations	<input checked="" type="checkbox"/>	Operations & Maintenance	<input checked="" type="checkbox"/>	Sludge Handling/Disposal	<input checked="" type="checkbox"/>	Oily bilge water	<input checked="" type="checkbox"/>	Other

Section C: For vessels discharging ≥ 1 nm from berth and ≥ 6 knots only [2.1.3(A)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	
<input type="checkbox"/>	Operations as described in submitted documentation	
<input type="checkbox"/>	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	
	<u>Turbidity or equivalent</u> :	
	Last calibration –	
	Trigger level for early alarm:	Trigger level for shutdown:
	Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
<input type="checkbox"/>	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

<input checked="" type="checkbox"/>	Schematics match black/gray wastewater system	Schematics appeared to be consistent with they system on board.
<input checked="" type="checkbox"/>	Operations as described in submitted documentation	Operations were as described.
<input checked="" type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring	Has continuous TSS monitoring.
<input checked="" type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Appears to be functioning properly.
	<u>Turbidity or equivalent</u> :	

	Last calibration – Calibrations are triggered by the AMOS maintenance system Trigger level for early alarm: 20 mg/l Trigger level for shutdown (recirculation): 28 mg/l switches automatically to hold and 30 mg/l to shut down. Recorded turbidity/equivalent levels above triggers: None to the best of their knowledge	
<input checked="" type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	A value of 28 mg/l or greater triggers automatic shut down of that MBR.
<input checked="" type="checkbox"/>	Disinfection immediately prior to discharge	Protocol: When discharging, UV occurs immediately prior to discharge.
<input checked="" type="checkbox"/>	Disinfection system operated and maintained properly	The UV system appeared to be operational and maintained well.
	Disinfection System: The disinfection system consists of 3 UV units, of which two are typically used with 14 bulbs each. There are typically about 20 spare bulbs on board. In April some of the bulbs were replaced per the AMOS maintenance system. The bulbs are alarmed for bulb failure and intensity at 10 watts. At the time of the inspection, the two operating UV units were at 46 W/m ² and 54 W/m ² . The UV sleeves are cleaned by dosing Metal Bright cleaner automatically.	

Section E: General (Approved to Discharge)

<input checked="" type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tye Shoal)	There is a clear protocol in place to discharge until close to area where shellfish beds are located and then to begin discharging when at Port and the same on the way out. This way they keep discharges completely out of the are of ½ mile from shellfish beds.
<input checked="" type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	They do have their systems set up to automatically shut down the discharge if high TSS (equivalent to turbidity) occurs.
<input checked="" type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	There are notification numbers posted and a copy of the current MOU was on board. A new notification list included DOH numbers is also posted.
<input checked="" type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted as required, as of the date of the inspection.
<input checked="" type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Wet testing is being scheduled for this season.
<input checked="" type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	The new requirements were well known and the Health numbers will also be supplied to the medical staff.
<input checked="" type="checkbox"/>	Immediate notifications to Health for GI >2% passengers or crew	The new requirements were well known and the Health numbers will also be supplied to the medical staff.

Section F: General

<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly.
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Residual solids are held to be discharged at greater than 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste discharges.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.

Other:

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	<10 mg/l
Total Suspended Solids (TSS)	10 mg/l
Fecal Coliform	390 CFU/100 ml
Residual Chlorine	0.76 mg/l
pH	7.30 unit
Ammonia, Nitrogen	75 mg/l

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program (NWRO-WQ) along with Karen Burgess, Ecology, NWRO-WQ, and Mark Toy, Washington State Department of Health, Office of Shellfish and Water Protection conducted the inspection of the Norwegian Cruise Line NORWEGIAN STAR on July 26, 2008. The main contacts on board the NORWEGIAN STAR included Davor Baletin, Environmental Officer; and Joebert Orrica, Environmental Engineer. Prior notification of the visit was given on July 22, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. A copy of the current MOU was on-board. The NORWEGIAN STAR received approval to discharge continuously on May 12, 2008.

The NORWEGIAN STAR was built in 2001, is 965 feet long with 15 guest decks, with about a 28-foot draft. There are typically about 2700 passengers and 1100 crew. It is my understanding that the ship's wastewater system, Scanship, was installed in 2004.

Inspection

We arrived and boarded the ship at about 12:40 pm and began with introductions and a plan for the day with Davor Baletin, Environmental Officer. We then headed to the Engine Control Room (ECR) area and discussed various waste streams, and the discharge protocols. Discharge records were reviewed for blackwater and graywater discharges and later for hazardous waste off-loads. We then discussed the blackwater and graywater system in detail. Next, we viewed the garbage sorting area and hazardous waste storage. We then toured the Hamworthy system and took samples. The inspection was then finalized and we disembarked the vessel at about 2:27 pm.

Discharge Types and Protocols:

If a discharge is allowed, the Bridge authorizes any discharge. The bridge contacts the Environmental Officer who has the key to unlock the discharge ports. The Chief Engineer and the Captain are the only other ones with a key. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. All discharge records that were reviewed appeared to be in compliance with the MOU.

Blackwater, which includes toilet waste and infirmity drains and graywater which includes sink and shower and laundry water is treated with a Scanship advanced wastewater treatment system (photo #10) and is discharged continuously with the exception of the area near shellfish beds. There is a clear protocol in place to discharge until close to area where shellfish beds are located and then to begin discharging when at Port and the same on the way out. This way they keep discharges completely out of the area of ½ mile from shellfish beds. When there is a GI outbreak of more than 2% of total persons on board, discharges are stopped and notifications made.

Screenings and grit from drum screen and well as biomass (sewage sludge) from the Scanship system is held and then discharged outside of MOU waters, >12 nautical miles from shore, and outside of the Olympic Coast National Marine Sanctuary.

Pool and spa water is discharged outside of 12 nautical miles. Ballast water is only exchanged during repositioning cruises to and from Los Angeles, CA and occurs outside of 50 miles.

Food waste is collected in various locations, is sent through a pulper (photo #05). The water is recirculated and eventually held and discharged outside of 4 nautical miles. Pulped solid waste is discharged outside of 4 nautical miles, and non-pulped waste is discharged outside of 12 nautical miles. Grease, or cooking oil is collected (photo #07) sent to the sludge tank for discharge outside of MOU waters (approximately 100 liters per day).

Oily bilge water is sent to a dirty bilge tank and then onto the Marinfloc for separating oil. Liquid from the Marinfloc goes to the Clean bilge tank and onto the oily water separator. From the oily water separator, the oil content is again measured in the locked "white box". If the parts per million exceed 15, there the discharge valve closes and sends the waste either to the clean bilge tank where it then again goes through the oily water separator or it can be sent all the way back to the dirty bilge tank. Residue and oily sludge is off-loaded in Prince Rupert.

Potable water that is bunkered is sampled after chlorination (pH, chlorine, coliform...). After chlorination, water is sent to a potable only tank. Water is also produced by desalination using a reverse osmosis system. Three evaporators are used that are run by engine heat. The reverse osmosis water for general use is chlorinated at least 2 ppm and is sent to a tank designated for consumption. At the farthest point, the chlorine residual is to be between 0.2 ppm and 5 ppm. The salt that is collected through the production process is sent back to the salt water. A descaler chemical is used on the evaporators and

is adjusted for pH before discharge at Sea.

Dry cleaning uses PERC which is off-loaded as hazardous waste in Prince Rupert. Silver is captured from the photo waste, treated to less than 5 ppm and is off-loaded as non-hazardous waste. Some of the X-ray waste is hazardous and off-loaded as such, while some is non-hazardous and off-loaded as such. Other hazardous wastes include batteries, paints, carbon filters, aerosols (punctured), and sharps. Fluorescent bulbs are crushed with a system that removes mercury (photo #04) by filter which is sent off as hazardous waste. Medical, red bag waste is typically incinerated or can be off-loaded as bio-medical waste. All hazardous waste (photo #09) is off-loaded in Prince Rupert. Narcotics are logged and incinerated. Unexpired pharmaceuticals are returned to the vendor. Expired medications are landed as non-hazardous waste, although some P-listed may be landed as hazardous. Other materials incinerated include paper, cardboard, oily rags and some burnable plastics.

Plastics, garbage, and other materials are collected and sorted on a sorting table. Crew do their own sorting of their own wastes (photo #06). Most materials are then condensed and recycled on-shore. Glass (photo #01), aluminum, tin, scrap metal and plastics, and some cardboard (photo #02) are all recycled along with other materials. Some materials are donated such as mattresses.

Black water and Gray water System:

Blackwater, which includes toilet waste and infirmary drains goes to one of 4 collection tanks and graywater which includes sink and shower and laundry water combines in tanks before combining and entering the drum screens. There are two drum screens (photo #11) which provide pre-screening. Solids from the drum screens go to the sludge tank. Liquid flow from the drum screens then enters the biostep tanks (photo #12) for biological treatment (biofilm on rotating plastic pieces – 2 tanks in series, air added). After biostep, flocculants and polymers (photo #08) are added. Clarification then occurs via flotation tanks (photos #13 and #14). The flotation tanks are cleaned by manual spray about once a week. Solids from the flotation tanks are sent to the sludge tank along with the screenings to be held for later discharge. Liquid flow then moves to the polishing filters (photos #15, #16, and #17) for ultrafiltration (2 rotating mesh drums), and then to ultraviolet disinfection. The polishing filters are cleaned about once a day. Flow then moves to ultraviolet light (UV) disinfection (photos #18 and #20). There are three UV units, of which two are typically used with 14 bulbs each. There are typically about 20 spare bulbs on board. In April some of the bulbs were replaced per the AMOS maintenance system. The bulbs are alarmed for bulb failure and intensity at 10 watts. At the time of the inspection, the two operating UV units were at 46 W/m² and 54 W/m². The UV sleeves are cleaned by dosing Metal Bright cleaner automatically. Flow from the UV units is either discharged directly overboard via the discharge port (photo #19) or is held for discharge later outside of MOU waters.

The cruise line uses a system called AMOS for work orders and maintenance. Manufacturer recommendations for maintenance of each piece of equipment is included in the AMOS system which triggers staff when maintenance is required. Scanship also monitors maintenance on the system. Any needed calibrations, cleaning, and other needed maintenance would be included in AMOS. Total suspended solids (TSS) (equivalent to turbidity) is monitored continuously at UV disinfection. If TSS exceed 20 mg/l, the system alarms and staff responds to investigate. At 28 mg/l, the system alarms and switches automatically to hold that discharge. At 30 mg/l, the effluent from the system is shut down. PH is also monitored for adjustments.

Samples were taken for Biochemical Oxygen Demand (BOD 5-Day), Total Suspended Solids (TSS), pH, chlorine residual, fecal coliform and ammonia from the combined effluent of the Scanship system after UV disinfection. The sample port was disinfected by heat prior to pulling samples (photo #21). The samples were put on ice immediately and were transported to AmTest laboratory in Redmond, Washington that afternoon. Chain of Custody and sampling procedures were followed. All results are in Section F. The results are typical of the results submitted to Ecology thus far for 2008 with the exception of fecal coliform and ammonia. Both the fecal and ammonia were higher with Ecology's testing than they have been for the other results submitted to date.

Conclusions and Recommendations

The protocols for discharging away from the shellfish beds was very clear.

It is recommended that staff continue to work towards a high functioning wastewater treatment system.

Attachments:

Photographs
Laboratory Report

Copies to:

Randy Fiebrandt, NCL
Davor Baletin, NCL

Amy Jankowiak, Ecology
 Karen Burgess, Ecology
 Mark Toy, Health
 Kevin Fitzpatrick, Ecology
 Central Files: Norwegian Cruise Line – NORWEGIAN STAR; WQ 6.1

Section I: Signatures

<u>Name and Signature of Inspector</u>	<u>Agency/Office/Telephone</u>	<u>Date</u>
Amy Jankowiak <i>Amy Jankowiak</i>	Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	8/14/08
<u>Name and Signature of Reviewer</u> Karen Burgess <i>Karen Burgess</i>	<u>Agency/Office/Telephone</u> Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7207	<u>Date</u> 8/15/08
<u>Name and Signature of Reviewer</u> Kevin C. Fitzpatrick <i>Karen Burgess for</i>	<u>Agency/Office/Telephone</u> Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	<u>Date</u> 8/15/08

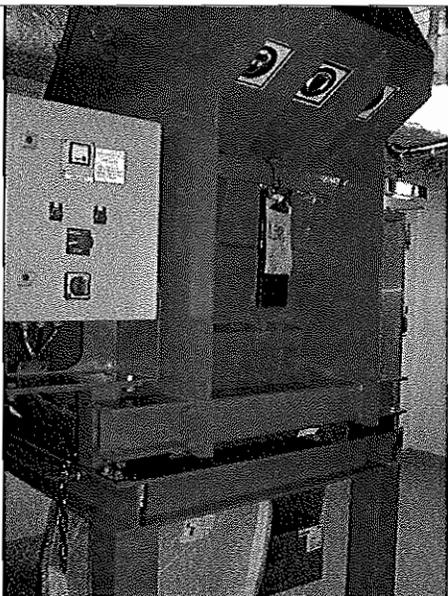


PHOTO #:01 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.:P7260021
DESCRIPTION: GLASS CRUSHER

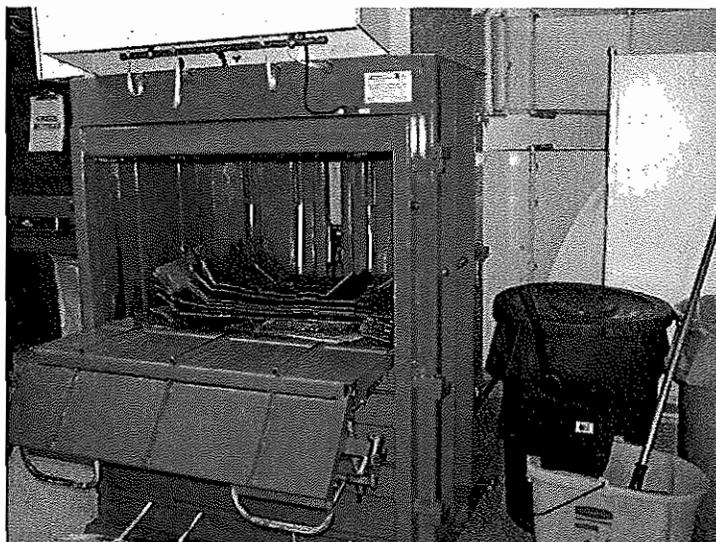


PHOTO #:02 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260022
DESCRIPTION: CARDBOARD CRUSHER

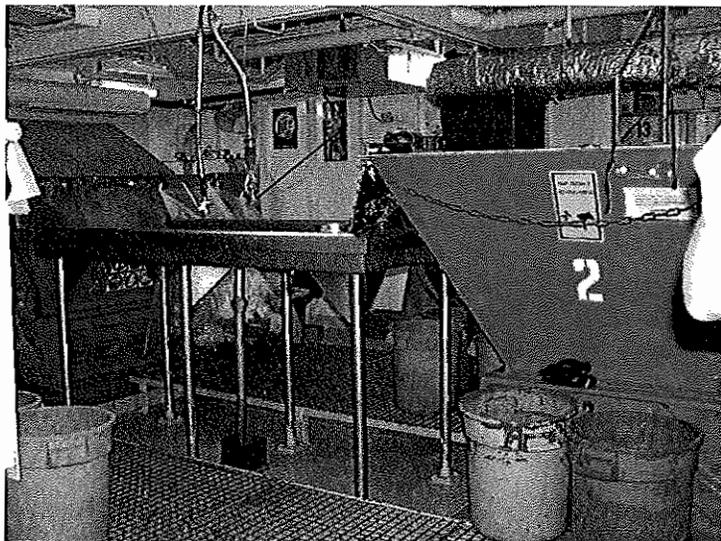


PHOTO #:03 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260023
DESCRIPTION: SORTING AREA TO INCINERATORS

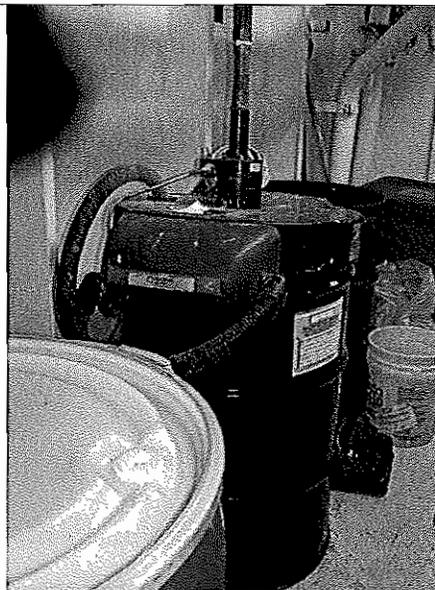


PHOTO #:04 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260025
DESCRIPTION: FLUORESCENT BULB CRUSHER/MERCURY
REMOVAL SYSTEM

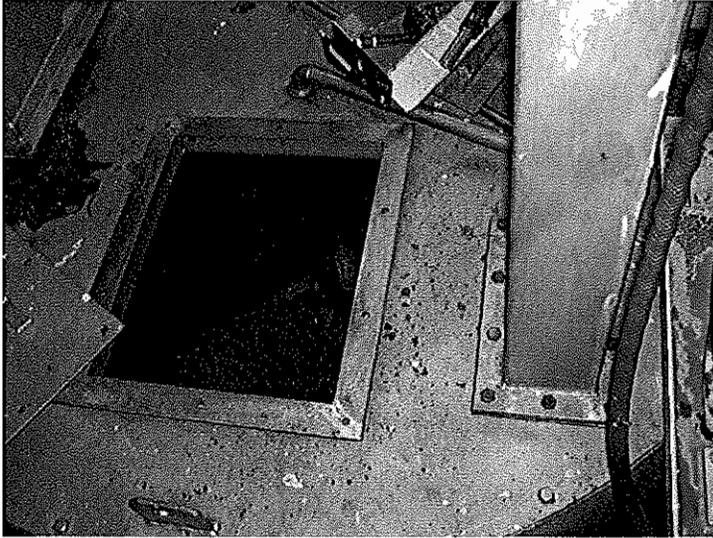


PHOTO #:05 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260026
DESCRIPTION: FOOD PULPER (1 OF 2)



PHOTO #:06 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260028
DESCRIPTION: CREW WASTE SORTING AREA

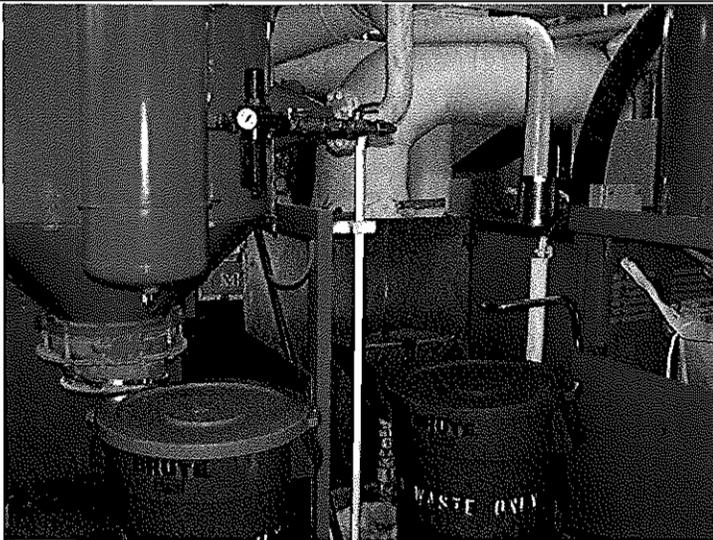


PHOTO #:07 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260029
DESCRIPTION: GREASE/COOKING OIL STORAGE



PHOTO #:08 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260030
DESCRIPTION: POLYMER (FOR SCANSHIP SYSTEM) STORAGE



PHOTO #:09 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.:P7260031
DESCRIPTION: HAZARDOUS WASTE STORAGE

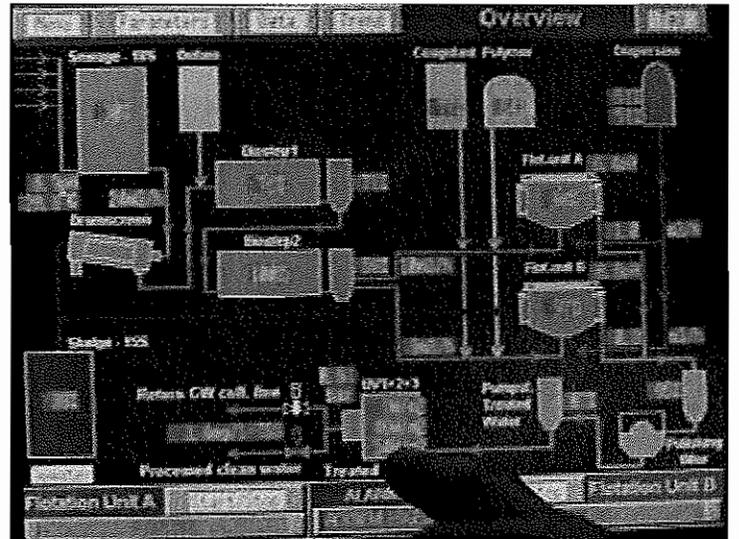


PHOTO #:10 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260020
DESCRIPTION: SCANSHIP SYSTEM SCREEN IN ECR

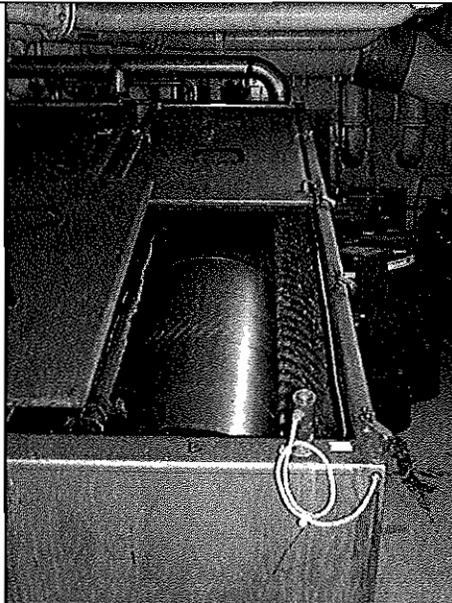


PHOTO #:11 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260032
DESCRIPTION: DRUMSCREENS



PHOTO #:12 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260034
DESCRIPTION: BIOSTEP TANK (1 OF 2)

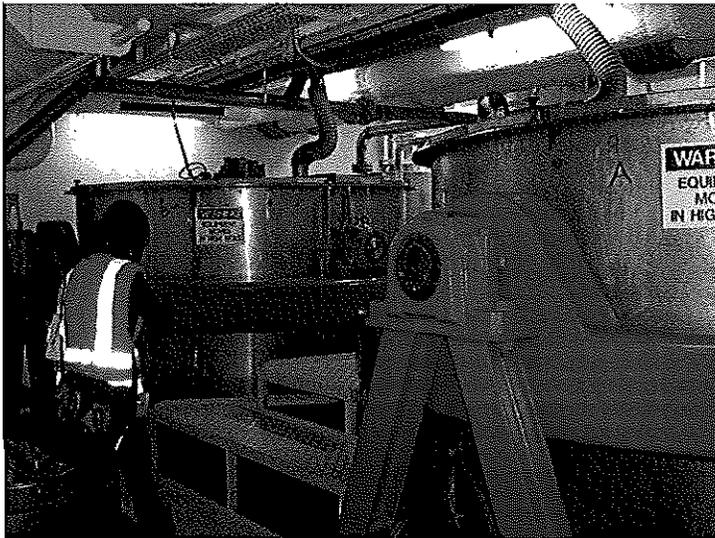


PHOTO #:13 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.:P7260035
DESCRIPTION: FLOTATION TANKS

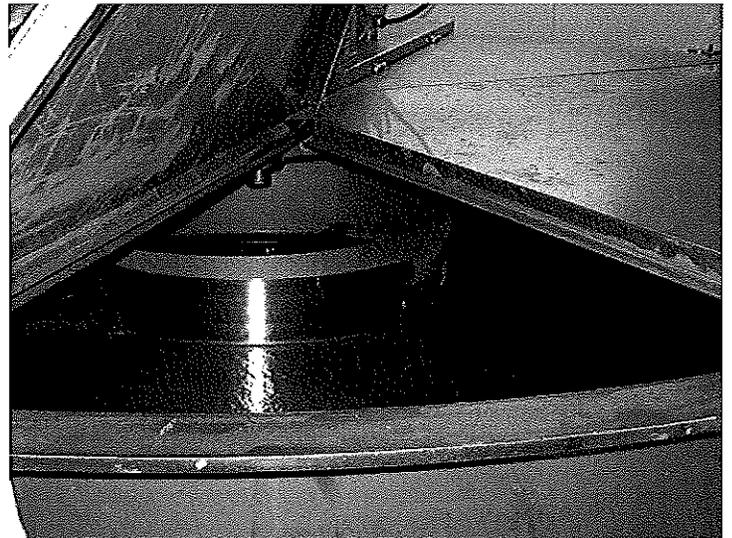


PHOTO #:14 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260036
DESCRIPTION: INSIDE OF ONE OF THE FLOTATION TANKS

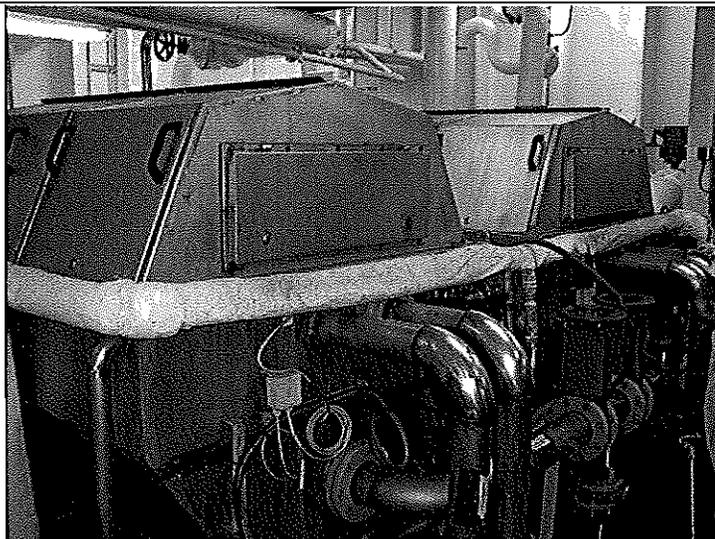


PHOTO #:15 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260037
DESCRIPTION: POLISHING FILTERS

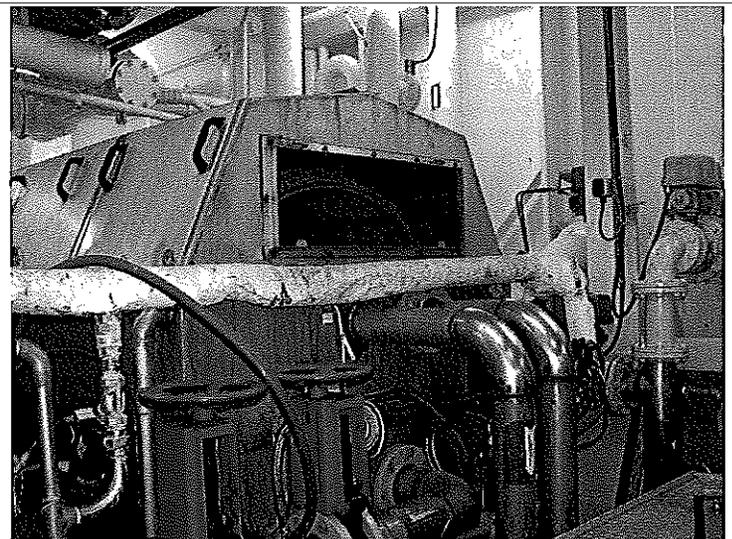


PHOTO #:16 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260038
DESCRIPTION: POLISHING FILTERS

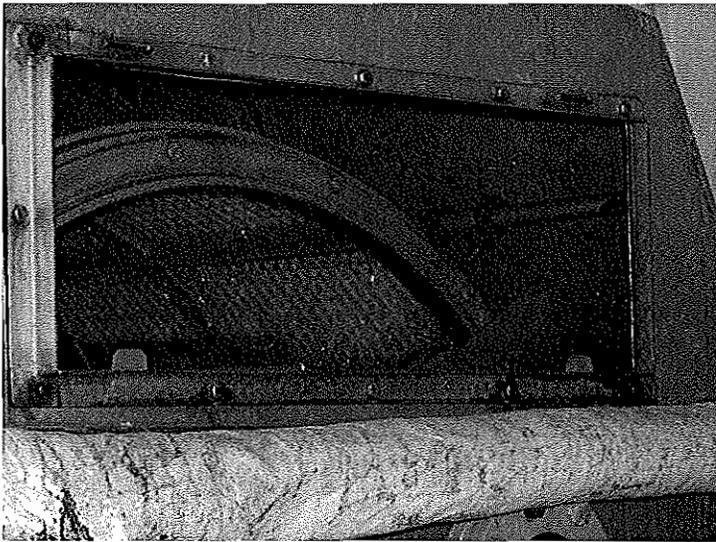


PHOTO #:17 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.:P7260039
DESCRIPTION: INSIDE OF ONE OF THE POLISHING FILTERS

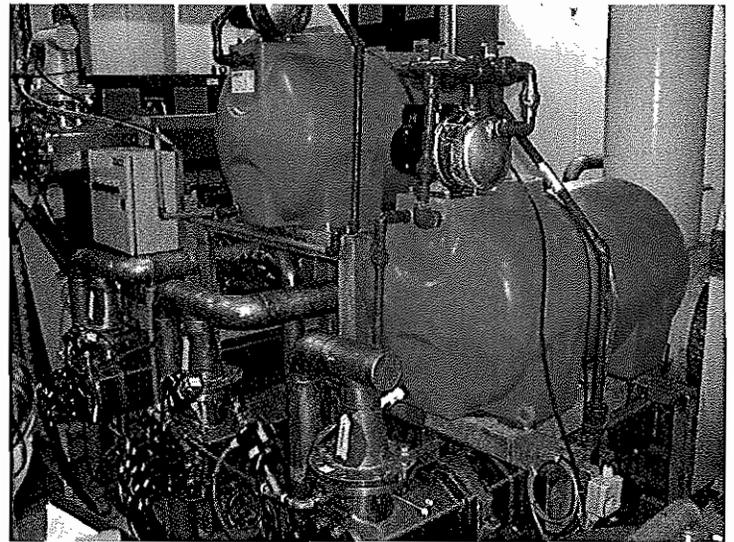


PHOTO #:18 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260040
DESCRIPTION: ULTRAVIOLET (UV) LIGHT DISINFECTION SYSTEM

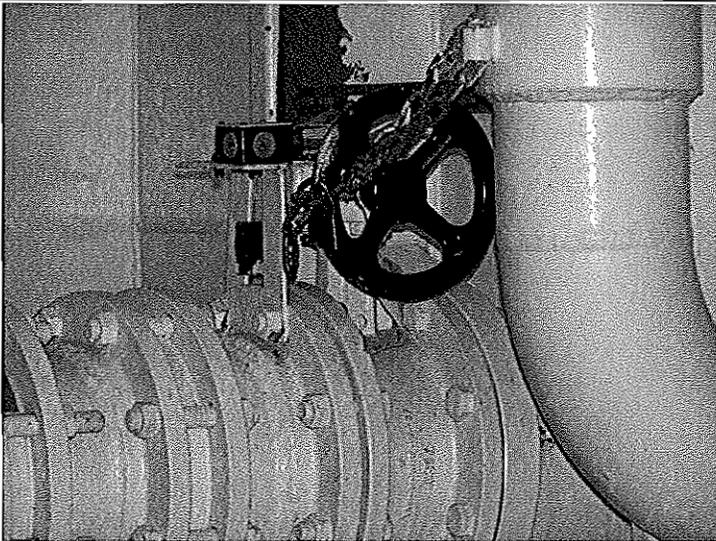


PHOTO #:19 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260041
DESCRIPTION: DISCHARGE PORT (WITH LOCK)

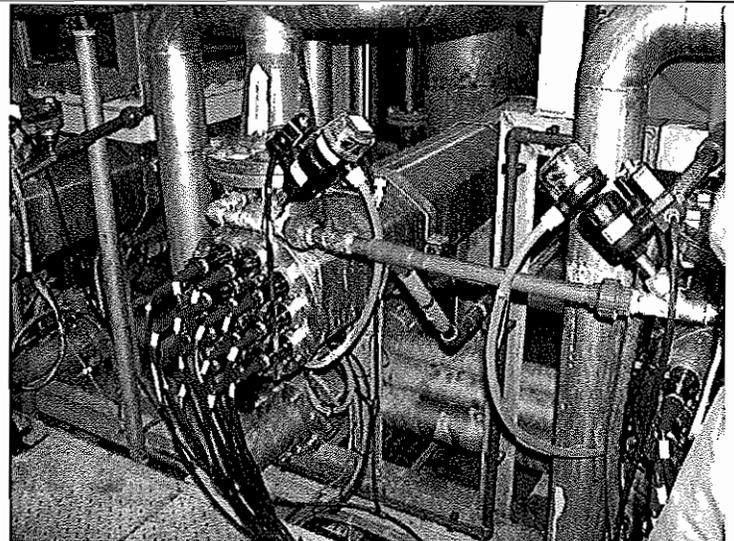


PHOTO #:20 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.: P7260042
DESCRIPTION: UV DISINFECTION SYSTEM

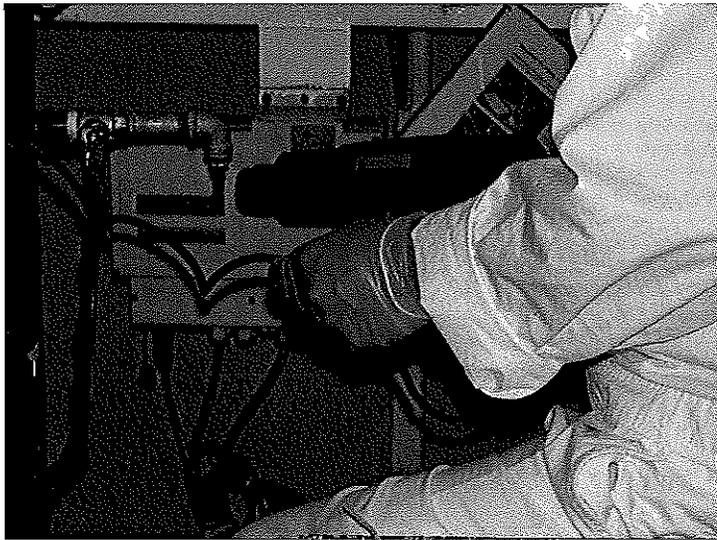


PHOTO #:21 DATE: JULY 26, 2008
TAKEN BY: KAREN BURGESS FILE No.:P7260043
DESCRIPTION: SAMPLE PORT (AFTER UV)

Am Test Inc.
14603 N.E. 87th St.
Redmond, WA 98052
(425) 885-1664
www.amtestlab.com

AMTEST
LABORATORIES
ANALYSIS REPORT

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Services

DEPARTMENT OF ECOLOGY
3190 160TH AVE SE
BELLEVUE, WA 98008
Attention: AMY JANKOWIAK
Project Name: NOWEGIAN STAR
All results reported on an as received basis.

Date Received: 07/26/08
Date Reported: 8/12/08

AMTEST Identification Number 08-A009612
Client Identification NORSTAR-EFF
Sampling Date 07/26/08, 14:09

Microbiological

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fecal Coliforms	390.	CFU/100 ml		1.	SM 9222D	NG	07/26/08 17:00

Conventionals

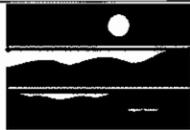
PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	7.30	unit			EPA 150.1	NG	07/26/08
Chlorine Residual	0.76	mg/l		0.10	EPA 330.5	AY	07/26/08
Total Suspended Solids	10.	mg/l		1.0	SM 2540D	SL	07/29/08

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
BOD	< 10	mg/l		10.	SM 5210B	NG	07/26/08

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	75.	mg/l		0.005	EPA 350.1	TS	08/07/08



State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	AMSTERDAM	Date:	August 22, 2008
Vessel Operator:	Holland America Line	Entry Time:	9:35 AM
Vessel Type:	Passenger Ship	Exit Time:	11:02 AM
Location:	Pier 30, Seattle	Notification (name & date):	Jon Turvey, Bill Morani; Bob Diaz; August 19, 2008
On-board contact(s):	Robert Vos, Environmental Officer; Dan Grabb, Manager ECP Audit/Support, HAL		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program; Marietta Sharp, Department of Ecology Solid Waste Program		
# passengers/crew:	1400/650		

The AMSTERDAM arrived on May 16th, 2008 at the Port of Seattle to begin the 2008 cruise season. The ship does not have an advanced wastewater treatment system. A traditional marine sanitation device is used for blackwater. All discharges are being held and then discharged outside of MOU waters.

Section B: Areas Evaluated

<input checked="" type="checkbox"/>	Black/Gray wastewater system	<input checked="" type="checkbox"/>	Residual solids	<input checked="" type="checkbox"/>	Records/Reports	<input checked="" type="checkbox"/>	Hazardous Waste/Solid Waste	<input type="checkbox"/>	Sampling/Monitoring
<input checked="" type="checkbox"/>	Discharge locations	<input checked="" type="checkbox"/>	Operations & Maintenance	<input checked="" type="checkbox"/>	Sludge Handling/Disposal	<input checked="" type="checkbox"/>	Oily bilge water	<input checked="" type="checkbox"/>	Other

Section C: For vessels discharging ≥ 1 nm from berth and ≥ 6 knots only [2.1.3(A)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	Not Applicable
<input type="checkbox"/>	Operations as described in submitted documentation	Not Applicable
<input type="checkbox"/>	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	Not Applicable
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable
	<u>Turbidity or equivalent</u> : Not Applicable Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if high turbidity occurs	Not Applicable
<input type="checkbox"/>	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	Not Applicable
<input type="checkbox"/>	Operations as described in submitted documentation	Not Applicable
<input type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring	Not Applicable
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable
	<u>Turbidity or equivalent</u> :	

	Last calibration Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	Not Applicable
<input type="checkbox"/>	Disinfection immediately prior to discharge	Not Applicable
<input type="checkbox"/>	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section E: General (Approved to Discharge)

<input type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	Not applicable
<input type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	Not applicable
<input type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	Not applicable
<input type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Not applicable
<input type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Not applicable
<input type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	Not applicable
<input type="checkbox"/>	Immediate notifications to Health for GI >2% passengers or crew	Not applicable

Section F: General

<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the date of last year's inspection to present (vessel last inspection was August 17, 2007).
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Screened solids are collected and sent to shore in Victoria. Biomass from the bottom of the MSD is collected and discharged outside of MOU waters, at greater than 12 nautical miles and outside of the Olympic Coast National Marine Sanctuary.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste off-loads.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste that is collected is being sent off-shore in Victoria, Canada. Records were reviewed for hazardous waste off-loads.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm and outside of MOU waters.

Other:

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program and Marietta Sharp, Ecology, Solid Waste Program (biosolids), conducted the inspection of the Holland America Line (HAL) AMSTERDAM on August 22, 2008. The main contacts on board the AMSTERDAM included Robert Vos, Environmental Officer, and Dan Grabb, HAL. Prior notification of the visit was given on August 19, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. The AMSTERDAM is currently not approved for and is not discharging black or graywater into MOU waters.

The HOLLAND AMSTERDAM was delivered in 2000, and is 780 feet long with about a 26-foot draft. There passenger capacity is about 1400 and the crew capacity is about 650. The vessel is powered with on-shore power during port calls in Seattle.

Inspection

We arrived and boarded the ship at about 9:35 am and began with introductions and a plan for the day with the Robert Vos, the Environmental Officer and Dan Grabb with Holland America Line. We then discussed various waste streams, and the discharge protocols. We went to the Deck to view the maps depicting discharge locations. Discharge records were reviewed for blackwater and graywater discharges, hazardous waste off-loads, oil and garbage. We then viewed and discussed the black water treatment system. We toured the garbage and recycling area and the dry cleaning. The inspection was then finalized and we disembarked the vessel at about 11:02 am.

Discharge Types and Protocols:

All discharges to water occur at greater than 12 nautical miles (nm) and outside of MOU waters. No discharges occur in the Olympic Coast National Marine Sanctuary (OCNMS). Only upon verification of location between the Bridge and the Engine Control Room (ECR), will a discharge occur at greater than 12 nm and outside of MOU waters. If a discharge is allowed, the Bridge authorizes any discharge. The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. On the deck, a map shows the area where discharges may occur which is outside of MOU waters, outside of 12 nm from shore, and outside of the OCNMS. Discharges also do not occur in Canadian waters. The discharge ports have a lock on them, and only when permission is granted by the bridge, will staff unlock the discharge ports.

The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, volumes, and speed. All discharge records that were reviewed appeared to be in compliance with the MOU. Records were reviewed from the time of the last inspection of August 17, 2007 to present.

Blackwater, which includes toilet waste and infirmary drains, is treated with a Hamworthy marine sanitation device (MSD) and is then discharged outside of MOU waters. Graywater, which includes galley wastewater and laundry water is collected and roughly filtered then liquid is held without further treatment to be discharged outside of MOU waters.

Screening solids collected during prefiltration of the MSD and from the rough filter on graywater are collected and off-loaded in Victoria. The solids collected at the bottom of the MSD, known by the cruise lines as "biomass" is collected into a tank and then discharged outside of MOU waters, >12 nm from shore, and outside of the Olympic Coast National Marine Sanctuary.

Oily bilge water is sent to the 50 ppm oily water separator (FACET), then to the intermediate tank and then to the 15 ppm oily water separator (SEREP). The effluent that meets 15 ppm is either discharged at greater than 12 nm and outside of MOU waters or is sent to a clean tank and later discharged. All effluent first goes through the "white box" prior to discharge.

Food waste is collected in various bins. Water is then extracted from the food. The liquid food waste is sent to the graywater tanks. The solid food is discharged through a chute a couple of times a week. Grease is collected separately and off-loaded to shore, often for biodiesel use in Victoria.

Laundry water is sent to the graywater tanks. Dry cleaning has been switched from a system using Perchloroethylene (PERC) to an organic oil based system (like banana oil).

Pool and spa water is discharged outside of MOU waters.

Potable water is bunkered now and then, while the rest is produced by desalination. Steam from the engines heat up the sea water. A boiler is also used. The condensate is then chlorinated and adjusted for pH prior to distribution. Salt collected from the evaporators is sent back to the sea. Scaling is treated with acid and is then neutralized prior to discharge at sea.

Drains from the infirmary are sent to the blackwater MSD. X-ray's are done digitally, and therefore there is no x-ray waste. Medical waste that is not hazardous is collected in white bags and incinerated. Red bags are used for material containing bodily fluids, and along with sharps are collected and sent to shore with hazardous waste. Medications that are expired or not used are sent back to the manufacturer. Narcotics are sent to the MSD with witnesses.

Silver is captured from the photo waste, collected and off-loaded as non-hazardous waste in Victoria. Digital photos are used primarily. All hazardous wastes to shore are off-loaded in Victoria about once a month.

Paint waste, electronics, and flares or pyrotechnics are also off-loaded with hazardous waste in Victoria.

Plastics, garbage, and other materials are collected and sorted into various color-coded cans and sorted on a sorting table (crew now sorts their own wastes). The materials are then condensed and recycled on-shore. The oily rags, food-contaminated wood pallets and food-contaminated cardboard is incinerated. Cardboard is collected and off-loaded for recycling. Glass is shredded to a small size and then discharged outside of MOU waters and outside 12 nm. Aluminum, tin, paper, batteries and plastics are all recycled along with other materials. The amount of materials collected and recycled is maximized in order to minimize the amount of materials incinerated or land filled. Fluorescent light bulbs are collected and crushed in a system that collects the mercury vapors. The material is then off-loaded with hazardous waste.

Holland America Line is ISO 14001 Certified. The AMSTERDAM is equipped for shore power in Seattle and was connected during the inspection.

Blackwater System:

There are four (4) marine sanitation devices (MSD) on board to treat blackwater. Blackwater consists of toilet waste and infirmary drains. All of the MSDs are used at the same time except for cleaning. When cleaning an MSD, the tanks are emptied and discharged overboard outside of MOU waters. Blackwater is collected by vacuum and then goes through pre-filtration. The solids are collected and sent ashore in Victoria. The liquid flow then enters the MSD tank for aeration and baffles through the large tank to a final area where chlorine (sodium hypochlorite) is added.

Sampling is not required per the MOU when not approved and not discharging. No samples were taken by Ecology.

Conclusions and Recommendations

Staff seemed very knowledgeable of the protocols and records were very orderly.

The efforts made towards waste minimization and energy conservation are impressive.

It is recommended that staff continue to work towards high functioning treatment systems.

Copies to:

Dan Grabb, HAL

William Morani, Jr., HAL

Bob Diaz, HAL

John Turvey, HAL

Tina Stoltz, HAL

Robert Vos, Environmental Officer

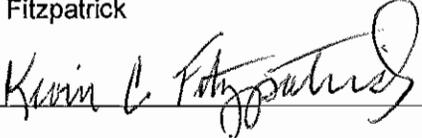
Amy Jankowiak, Ecology

Mark Toy, Health

Kevin Fitzpatrick, Ecology

Central Files: Holland America Line – HOLLAND AMSTERDAM; WQ 6.1

Section I: Signatures

<u>Name and Signature of Inspector</u> Amy Jankowiak 	<u>Agency/Office/Telephone</u> Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	<u>Date</u> 9/29/08
<u>Name and Signature of Reviewer</u> Kevin C. Fitzpatrick 	<u>Agency/Office/Telephone</u> Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	<u>Date</u> 9/29/08



State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	RHAPSODY OF THE SEAS	Date:	August 29, 2008
Vessel Operator:	Royal Caribbean International	Entry Time:	9:35 AM
Vessel Type	Passenger Ship	Exit Time:	11:01 AM
Location:	Pier 30, Seattle	Notification (name & date):	Rich Pruitt; August 25, 2008
On-board contact(s):	Geoff Gibbs, Environmental Officer; Nikolay Kolev, 2 nd Environmental		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program; Marietta Sharp, Department of Ecology, Solid Waste Program		
# passengers/crew:	~2435/~946		

The RHAPSODY OF THE SEAS arrived on May 23rd, 2008 at the Port of Seattle to begin the 2008 cruise season. They currently have a traditional marine sanitation device for blackwater that includes screening, aeration and chlorination. Graywater is coarsely screened. Approval for continuous discharge from Ecology has not been requested nor issued. The vessel has been holding effluent and not discharging in MOU waters since the beginning of the season.

Section B: Areas Evaluated

<input checked="" type="checkbox"/>	Black/Gray wastewater system	<input checked="" type="checkbox"/>	Residual solids	<input checked="" type="checkbox"/>	Records/Reports	<input checked="" type="checkbox"/>	Hazardous Waste/Solid Waste	<input type="checkbox"/>	Sampling/Monitoring
<input checked="" type="checkbox"/>	Discharge locations	<input checked="" type="checkbox"/>	Operations & Maintenance	<input checked="" type="checkbox"/>	Sludge Handling/Disposal	<input checked="" type="checkbox"/>	Oily bilge water	<input checked="" type="checkbox"/>	Other

Section C: For vessels discharging ≥ 1 nm from berth and ≥ 6 knots only [2.1.3(A)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	Not Applicable.
<input type="checkbox"/>	Operations as described in submitted documentation	Not Applicable
<input type="checkbox"/>	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	Not Applicable
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable
	<u>Turbidity or equivalent</u> : Not Applicable Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if high turbidity occurs	Not Applicable
<input type="checkbox"/>	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	Not Applicable
<input type="checkbox"/>	Operations as described in submitted documentation	Not Applicable
<input type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring	Not Applicable
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Not Applicable
	<u>Turbidity or equivalent</u> : Not Applicable	

	Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	Not Applicable
<input type="checkbox"/>	Disinfection immediately prior to discharge	Not Applicable
<input type="checkbox"/>	Disinfection system operated and maintained properly	Not Applicable
	Disinfection System:	

Section E: General (Approved to Discharge)		
<input type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tye Shoal)	Not Applicable
<input type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	Not Applicable
<input type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	Not Applicable
<input type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Not Applicable
<input type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Not Applicable
<input type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	Not Applicable
<input type="checkbox"/>	Immediate notifications to Health for GI >2% passengers or crew	Not Applicable

Section F: General		
<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Residual solids are collected into drums for off-loading in Canada.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	Hazardous waste has not been off-loaded yet this season and is collected and stored on-board.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	Hazardous waste has not been off-loaded yet this season and is collected and stored on-board.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste appeared to be managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 5 ppm (above and beyond the requirement of 15 ppm) and at greater than 13 nautical miles.
Other:		

Health = Washington State Department of Health

Section G: Sample Results		
Parameter	Results	
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable	
Total Suspended Solids (TSS)	Not Applicable	
Fecal Coliform	Not Applicable	
Residual Chlorine	Not Applicable	
pH	Not Applicable	
Ammonia, Nitrogen	Not Applicable	

Section H: Summary of Findings/Comments
<p>Introduction Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program, and Marietta Sharp, Ecology, Solid Waste Program (biosolids) conducted the inspection of the Royal Caribbean RHAPSODY OF THE SEAS on August 29, 2008. The main contacts on board the RHAPSODY OF THE SEAS included Geoff Gibbs,</p>

Environmental Officer; and Nikolay Kolev, 2nd Environmental. Prior notification of the visit was given on August 25, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. This is the first season that the RHAPSODY OF THE SEAS has visited Seattle. The RHAPSODY OF THE SEAS has not requested nor has received approval to discharge in MOU waters. The vessel has not been discharging and is holding effluent until outside MOU waters.

The RHAPSODY OF THE SEAS' maiden voyage was in 1997, and is 915 feet long with a width of 105.6 feet.

Inspection

We arrived and boarded the ship (photo #01) at about 9:35 am and began with introductions and a plan for the day with Geoff Gibbs, the Environmental Officer. Mr. Gibbs has been on this vessel previously and is back on the vessel for its last few weeks for this route. We first discussed the various waste streams and discharge protocols (photo #02). We then reviewed discharge records for black water and graywater, and garbage. We then met with Nikolay Kolev, 2nd Environmental, and discussed the current black water and gray water treatment. We then viewed the black water and gray water systems and the oily water separators. We then toured the food waste press, hazardous waste storage area and the new dry cleaning system. The inspection was then finalized and we disembarked the vessel at about 11:01 am.

Discharge Types and Protocols:

If a discharge is to occur (although not occurring in MOU waters), the Bridge contacts the engine control room and confirms location. The control room also logs the information. A pre-determined voyage plan is used as guidance, but locations are always verified prior to discharge. Some of the discharge ports have padlocks on them, others, are opened by the engineer on watch. For black water and gray water, the latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. All discharge records that were reviewed appeared to be in compliance with the MOU and did not occur in MOU waters.

Blackwater, which includes toilet waste and infirmity drains is currently treated with a traditional marine sanitation device that includes screening, aeration, and chlorination. Graywater which includes sink and shower water, laundry water, hair salon water and air conditioning condensate is coarsely screened only. Both black water and gray water is currently discharged outside of MOU waters, and outside of 13 nautical miles (nm) from shore. Galley water is collected separately and held for discharge at greater than 13 nm and outside of MOU waters.

Screenings and sewage sludge (biomass) from the black water and gray water is collected in drums (photo #24) and sent ashore in Vancouver, B.C.

Oily bilge water is treated with one of two oily water separator systems (photos #12 and #18) and discharged (photo #19) at less than 5 ppm at greater than 13 nm. A white box (photo #13) is used for additional monitoring assurance.

Pool water is discharged overboard periodically outside of 4 nm and outside of MOU waters. Spa water is discharged overboard daily outside of 4 nm and outside of MOU waters.

Paper, plastics, glass, aluminum, tin and cardboard are typical materials that are recycled. Dry garbage is offloaded as non-hazardous waste. Food contaminated cardboard is incinerated along with some garbage. Aerosol punctured cans are landed ashore along with florescent bulbs that have been crushed and mercury removed by filter. Aerosol puncturing and bulb crushing is only done while at sea. The materials are either off-loaded as hazardous or non-hazardous depending on the criteria where off-loading. Batteries are landed ashore but not recycled. Photo waste and medical x-ray waste goes through silver recovery and is landed ashore as hazardous waste. Red bagged medical waste and sharps are also landed ashore. White bagged medical waste is incinerated along with oily rags. Expired medications are incinerated at sea. There have not been any hazardous waste off-loads (photos #23 & #24) from this vessel this season. Garbage records looked to be in good order.

Food waste is collected in various locations and is sent to the SOMAT press (photo #22). Pulped food waste and water is collected and discharged (photo #21) outside of 13 nm.

Potable water is almost always bunkered and is only produced by desalinization when out at sea and at a speed of at least 21 knots.

A new dry cleaning system (photo #27) that uses hydrocarbon was just installed to replace a system using Perchloroethylene (PERC). The system uses a chemical called DF-2000 Fluid, an Aliphatic Hydrocarbon (photo #25).

Black water System:

Blackwater is collected by vacuum (photos #03 & #14) to one of four collection tanks (photo #06). From the collection tanks, the liquid is coarsely screened (photo #04) and then pumped (photo #05) and screened by a drum screen (photo #07). All solids collected are drummed and off-loaded in Canada. The screened liquid is sent to one of two treatment tanks (photo #08) where it is mixed with seawater (photo #09). The type I marine sanitation device (MSD) consists of aeration, baffles, a minimizing pump (photo #10) and then chlorination by sodium hypochlorite (photo #11). The liquid is then pumped to one of two holding tanks for discharge. Any solids collected from the MSD is also collected into the drums for shore side off-loading.

Gray water System:

The graywater system collects sink and shower water, laundry water (photo #16), hair salon water and air conditioning condensate. The graywater is collected in one of eight collection tanks (photo #15) and is then coarsely screened and then held (photo #17) for discharge (photo #20).

The vessel is currently undergoing a retrofit for a new blackwater and graywater advanced wastewater purification system. The system should be complete by early 2009. The new system will be a NAVALIS system consisting of equalization, aeration, solids separation, ultrafiltration, advanced oxidation and ultraviolet light disinfection. The new system will treat both black water and gray water. The vessel is expected to be back on this route next season.

Conclusions and Recommendations

Staff was very knowledgeable of the protocols and systems for treatment on board the vessel.

The installation of an advanced purification system is applauded for the overall environmental benefits that it will provide.

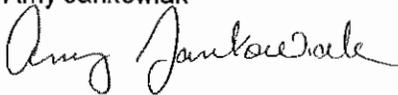
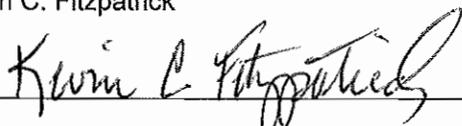
Attachments:

Photographs

Copies to:

- Rich Pruitt, RCCL
- Geoff Gibbs, Environmental Officer
- Amy Jankowiak, Ecology
- Mark Toy, Health
- Kevin Fitzpatrick, Ecology
- Central Files: Royal Caribbean – RHAPSODY OF THE SEAS; WQ 6.1

Section I: Signatures

<u>Name and Signature of Inspector</u>	<u>Agency/Office/Telephone</u>	<u>Date</u>
Amy Jankowiak 	Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	9/29/08
<u>Name and Signature of Reviewer</u>	<u>Agency/Office/Telephone</u>	<u>Date</u>
Kevin C. Fitzpatrick 	Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	9/29/08

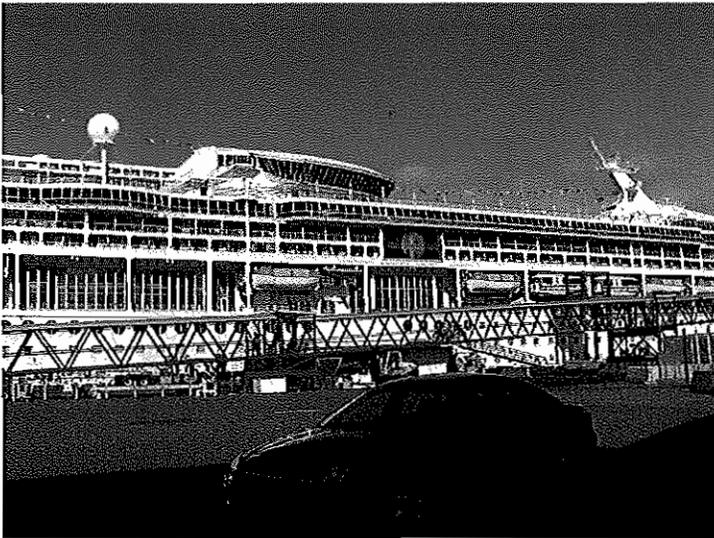


PHOTO #:01 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290001
DESCRIPTION: RHAPSODY OF THE SEAS VESSEL, SEATTLE

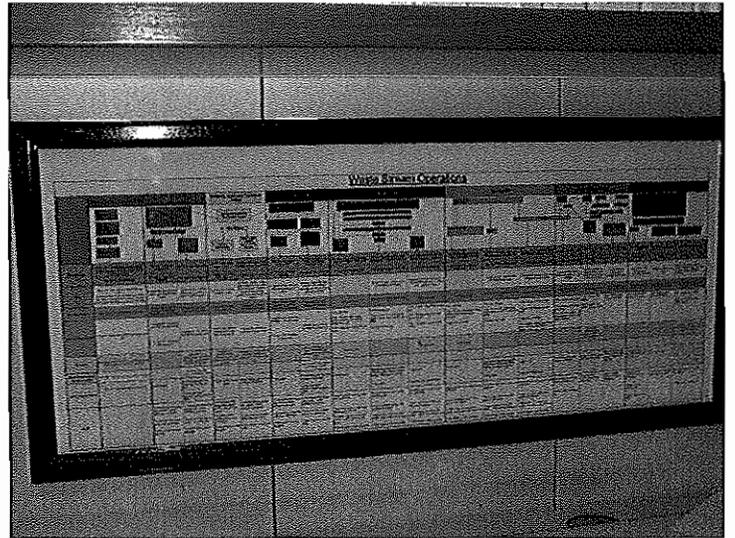


PHOTO #:02 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290004
DESCRIPTION: WASTE STREAM OPERATIONS CHART (ECR)

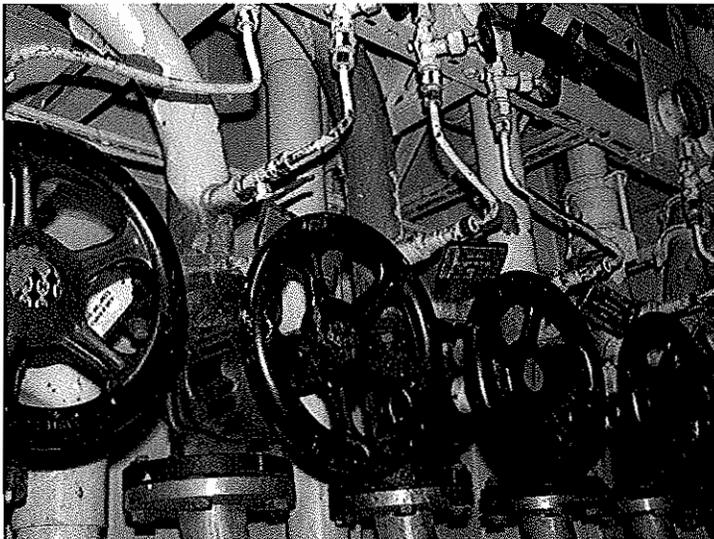


PHOTO #:03 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290006
DESCRIPTION: BLACK WATER VACUUM COLLECTION PIPES

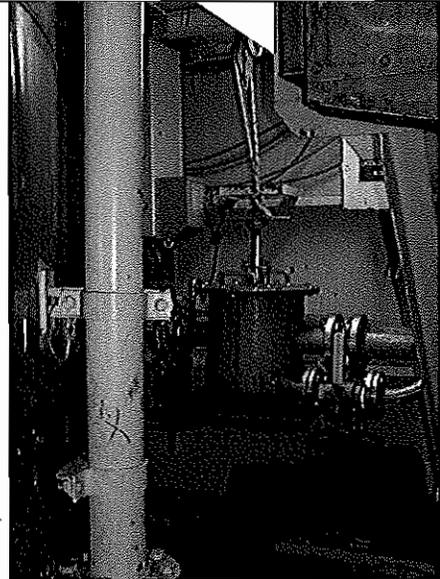


PHOTO #:04 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290007
DESCRIPTION: FIRST BLACK WATER FILTER

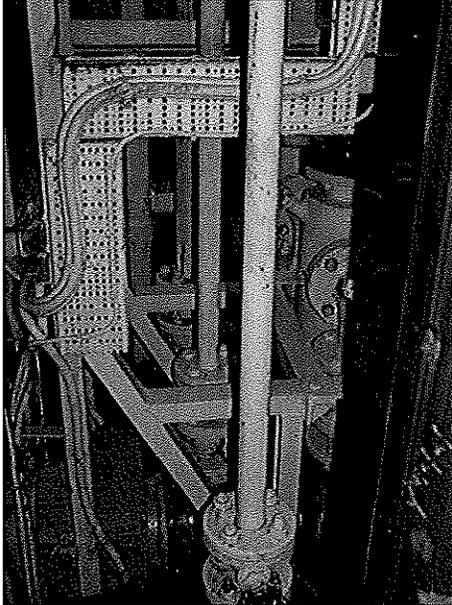


PHOTO #:05 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P8290008
DESCRIPTION: BLACKWATER PUMPS

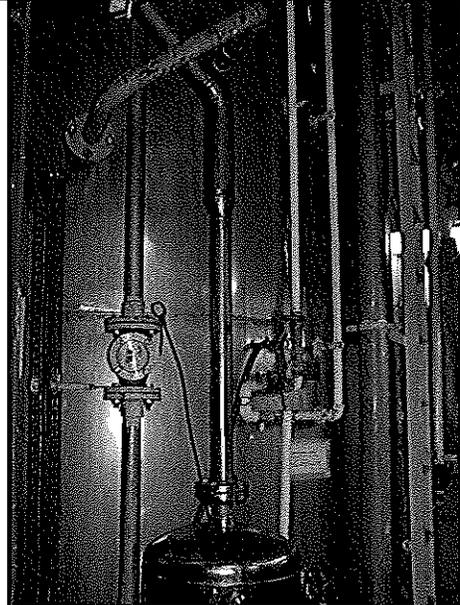


PHOTO #:06 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290009
DESCRIPTION: BLACKWATER COLLECTION TANK (1 OF 4)



PHOTO #:07 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290010
DESCRIPTION: BLACKWATER DRUM SCREEN (ABOVE EXIT SIGN)



PHOTO #:08 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290011
DESCRIPTION: BLACKWATER TREATMENT TANK (UNIT 2 OF 2)

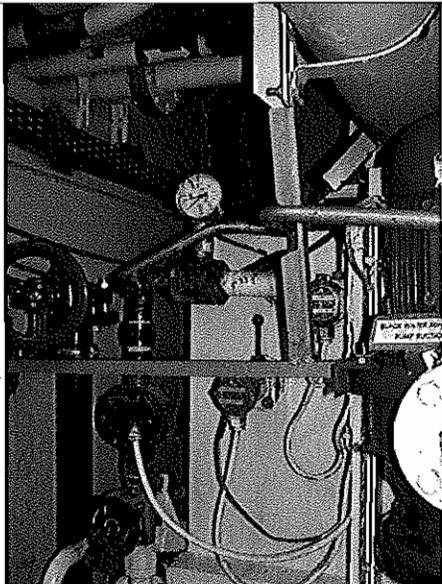


PHOTO #:09 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290012
DESCRIPTION: SEAWATER TO BLACKWATER TANK

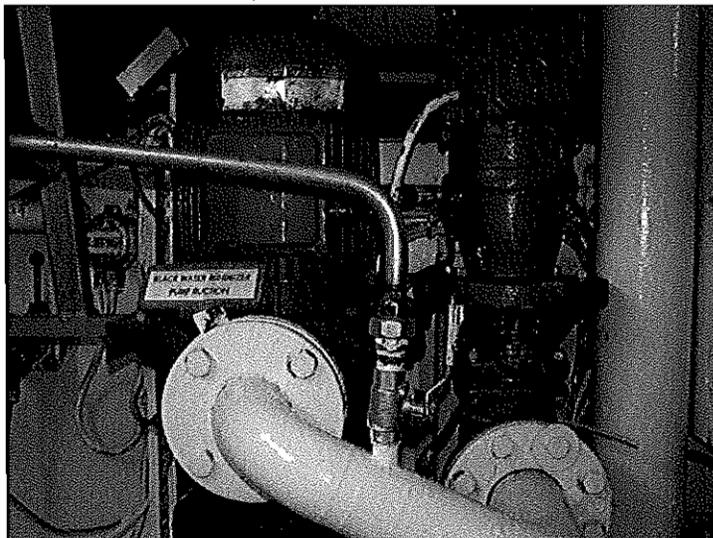


PHOTO #:10 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290013
DESCRIPTION: BLACKWATER MINIMIZING PUMP (LEFT) AND
DISCHARGE PUMP (RIGHT)



PHOTO #:11 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290014
DESCRIPTION: BLACKWATER CHLORINE DOSING

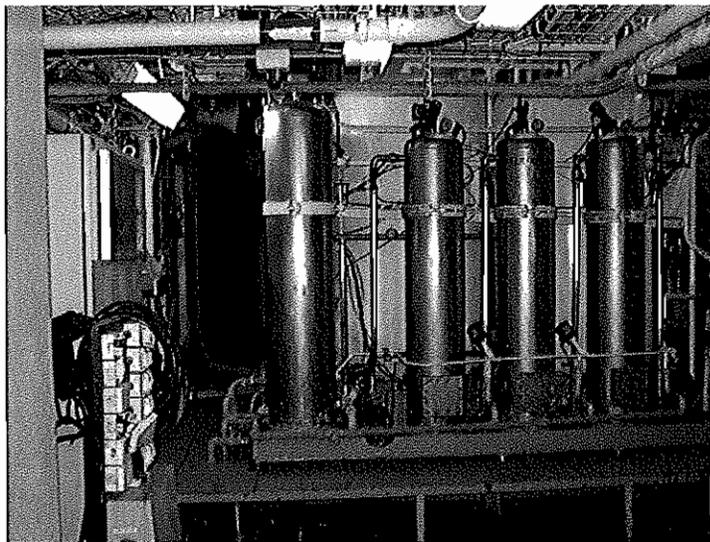


PHOTO #:12 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290015
DESCRIPTION: MARINFLOC OILY BILGE WATER SYSTEM (1 OF 2)

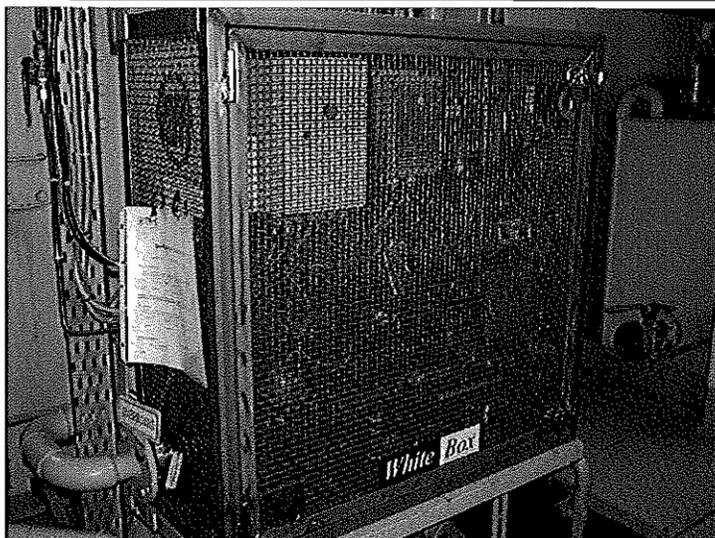


PHOTO #:13 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P8290016
DESCRIPTION: WHITE BOX FOR OILY BILGE SYSTEM



PHOTO #:14 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290017
DESCRIPTION: BLACK WATER FROM VACUUM COLLECTION SYSTEM



PHOTO #:15 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290018
DESCRIPTION: ONE OF THE EIGHT GRAY WATER COLLECTION TANKS

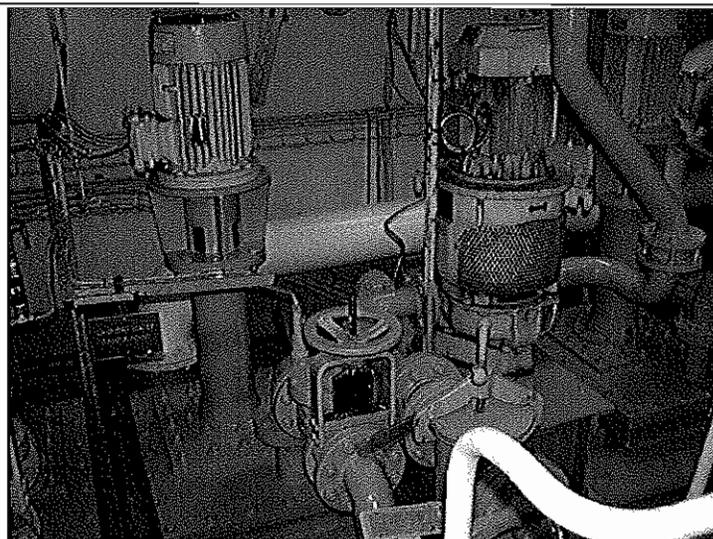


PHOTO #:16 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290019
DESCRIPTION: LAUNDRY TO GRAY WATER



PHOTO #:17 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P8290020
DESCRIPTION: GRAY WATER SAMPLE POINT (GRAY WATER
HOLDING TANK BELOW)



PHOTO #:18 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290021
DESCRIPTION: 2ND OILY BILGE WATER SYSTEM

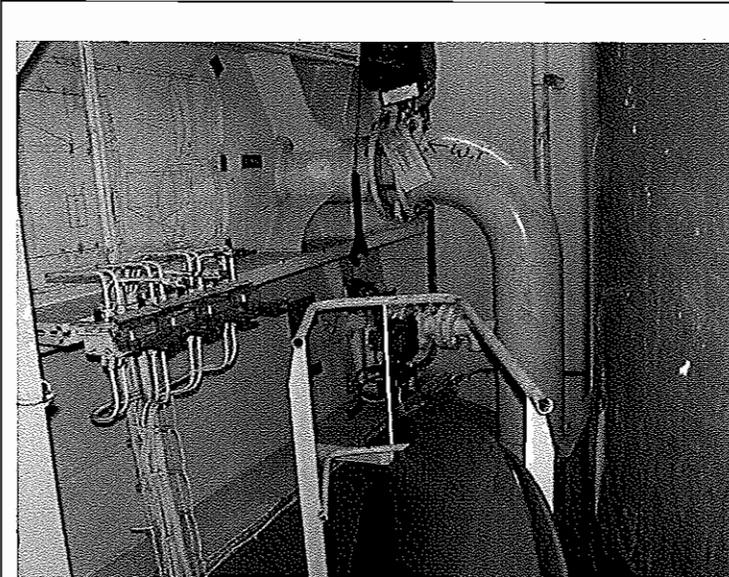


PHOTO #:19 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290022
DESCRIPTION: DISCHARGE POINT FOR CLEAN BILGE



PHOTO #:20 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290023
DESCRIPTION: GRAY WATER DISCHARGE PORT

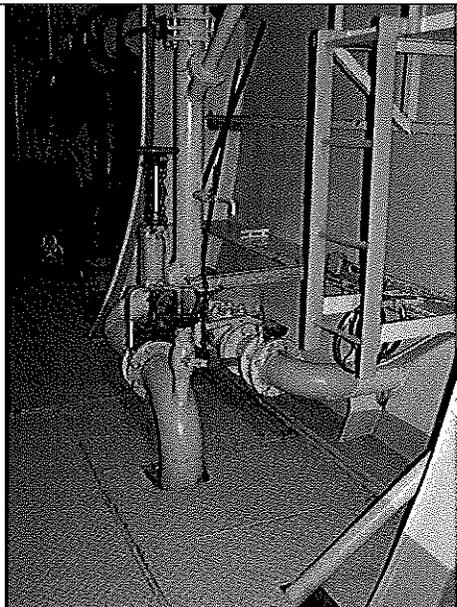


PHOTO #:21 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290024
DESCRIPTION: FOOD PUMPER DISCHARGE PORT



PHOTO #:22 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290025
DESCRIPTION: FOOD PULPER SOMAT



PHOTO #:23 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290026
DESCRIPTION: HAZARDOUS WASTE/NON-HAZARDOUS WASTE
STORAGE AREA



PHOTO #:24 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290028
DESCRIPTION: PHOTO WASTES (LEFT BLUE DRUM), BLACKWATER
SYSTEM SOLIDS (RIGHT BLACK DRUM), AND OTHER STORED
WASTES

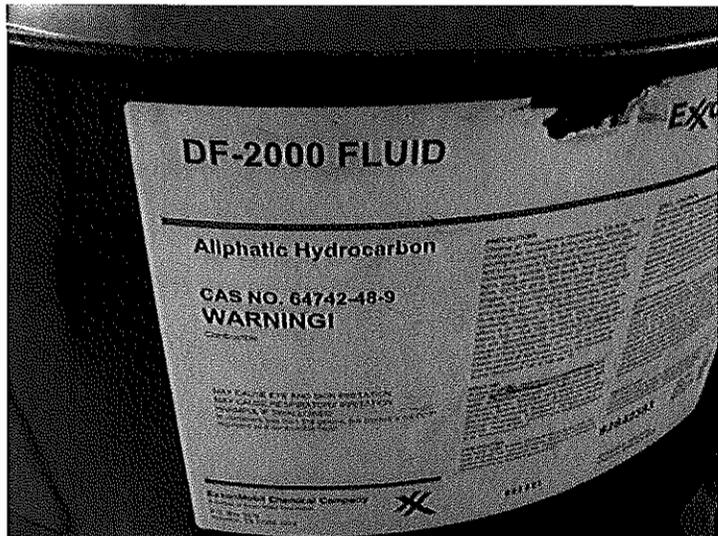


PHOTO #:25 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.:P8290029
DESCRIPTION: DF-2000 FLUID, ALIPHATIC HYDROCARBON FOR
NEW DRY CLEANING SYSTEM

PHOTO #:26 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290030
DESCRIPTION: DRY CLEANING WASTES (FILTERS, LINT)

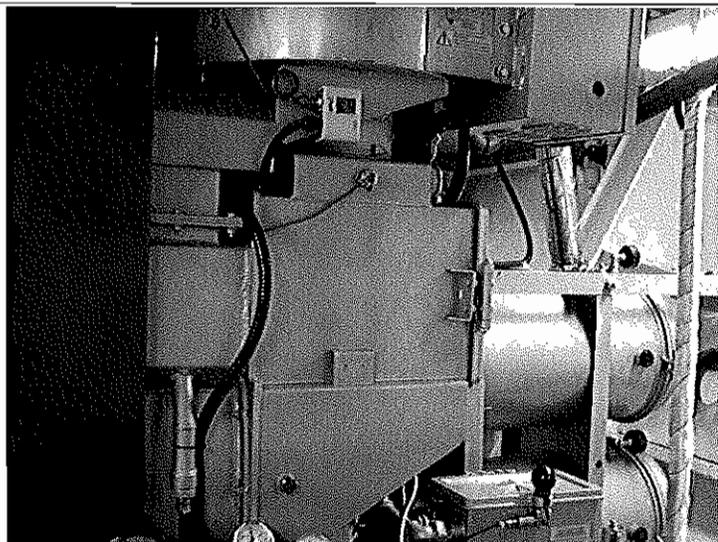
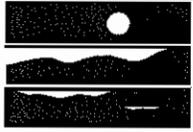


PHOTO #:27 DATE: AUGUST 29, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P8290031
DESCRIPTION: DRY CLEANING SYSTEM



State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	NORWEGIAN PEARL	Date:	September 14, 2008
Vessel Operator:	NCL (Bahamas) Ltd.	Entry Time:	9:28 AM
Vessel Type	Passenger Ship	Exit Time:	12:05 PM
Location:	Terminal 66, Seattle	Notification (name & date):	Randy Fiebrandt on September 11, 2008
On-board contact(s):	Matilda Ivanova, Environmental Officer, Daniel Gaza, Environmental Engineer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	~2394/~1100		

The NORWEGIAN PEARL arrived on May 2, 2008 at the Port of Seattle to begin the 2008 cruise season. Scanship is a biological reactor and ultrafiltration system. The system includes prefiltration, biological treatment via a biofilm process, chemical precipitation, clarification through flotation tanks, polishing filtration and UV disinfection. Approval for continuous discharge from Ecology was granted in 2007 and May 12, 2008.

Section B: Areas Evaluated

<input checked="" type="checkbox"/>	Black/Gray wastewater system	<input checked="" type="checkbox"/>	Residual solids	<input checked="" type="checkbox"/>	Records/Reports	<input checked="" type="checkbox"/>	Hazardous Waste/Solid Waste	<input checked="" type="checkbox"/>	Sampling/Monitoring
<input checked="" type="checkbox"/>	Discharge locations	<input checked="" type="checkbox"/>	Operations & Maintenance	<input checked="" type="checkbox"/>	Sludge Handling/Disposal	<input checked="" type="checkbox"/>	Oily bilge water	<input checked="" type="checkbox"/>	Other

Section C: For vessels discharging ≥ 1 nm from berth and ≥ 6 knots only [2.1.3(A)]

<input type="checkbox"/>	Schematics match black/gray wastewater system	
<input type="checkbox"/>	Operations as described in submitted documentation	
<input type="checkbox"/>	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring	
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if high turbidity occurs	
<input type="checkbox"/>	Disinfection system operated and maintained properly	
	Disinfection System:	

Section D: For vessels discharging continuously [2.1.3(B)]

<input checked="" type="checkbox"/>	Schematics match black/gray wastewater system	Schematics appeared to be consistent with they system on board.
<input checked="" type="checkbox"/>	Operations as described in submitted documentation	Operations were as described.
<input checked="" type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring	Has continuous TSS monitoring.
<input checked="" type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	Appears to be functioning properly.
	Turbidity or equivalent : Last calibration – Calibrations are done daily	

	Trigger level for early alarm: 20 mg/l Trigger level for shutdown (recirculation): 28 mg/l switches automatically to hold and 30 mg/l to shut down. Recorded turbidity/equivalent levels above triggers: Yes, shutdown is working	
<input checked="" type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	A value of 28 mg/l or greater triggers to hold and 30 mg/l for automatic shut down of that MBR.
<input checked="" type="checkbox"/>	Disinfection immediately prior to discharge	Protocol: When discharging, UV occurs immediately prior to discharge.
<input checked="" type="checkbox"/>	Disinfection system operated and maintained properly	The UV system appeared to be operational and maintained well.
	Disinfection System: The disinfection system consists of 3 UV units, of which two are typically used with 14 bulbs each. There are typically about 1 set (14) of spare bulbs on board. At the time of the inspection, the two operating UV units were at 43 W/m ² and 60 W/m ² . The UV sleeves are cleaned by dosing Metal Bright cleaner automatically.	

Section E: General (Approved to Discharge)

<input checked="" type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	The route that is used stays clear of ½ mile of the shellfish areas listed. Only in the case of a safety issue, would they need to enter the area. Discharges are to be stopped in that case.
<input checked="" type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	They do have their systems set up to automatically shut down the discharge if high TSS (equivalent to turbidity) occurs.
<input checked="" type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	There are notification numbers posted and a copy of the current MOU was on board.
<input checked="" type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	Sampling is being conducted as required, as of the date of the inspection.
<input checked="" type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	Wet testing samples were taken a week prior to the inspection for WET testing.
<input checked="" type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	The new requirements were well known and there is a protocol in place where the staff captain and the medical staff communicate. There have not been any outbreaks this season.
<input checked="" type="checkbox"/>	Immediate notifications to Health for GI >2% passengers or crew	The new requirements were well known and there is a protocol in place where the staff captain and the medical staff communicate. There have not been any outbreaks this season.

Section F: General

<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (black water/gray water/residual solids) and are maintained properly.
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Residual solids are collected, dried and incinerated.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	All hazardous waste that is collected is being sent off-shore in Victoria, Canada (with the exception of these last couple of weeks where they are holding their hazardous waste until repositioned in Miami). Records were reviewed for hazardous waste discharges.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	All hazardous waste is being off-loaded outside of Washington.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste is being managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate. Only food waste is occasionally discharged (usually incinerated) outside of MOU waters.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm (usually less than 5 ppm) and outside of MOU waters.

Other:

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	<10 mg/l
Total Suspended Solids (TSS)	5.0 mg/l
Fecal Coliform	<1 CFU/100 ml
Residual Chlorine	0.12 mg/l
pH	6.75 standard unit
Ammonia, Nitrogen	26 mg/l

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program (NWRO-WQ) conducted the inspection of the Norwegian Cruise Line NORWEGIAN PEARL on September 14, 2008. The main contacts on board the NORWEGIAN PEARL included Matilda Ivanova, Environmental Officer, and Daniel Gaza, Environmental Engineer. Prior notification of the visit was given on September 11, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. A copy of the current MOU was on-board. The NORWEGIAN PEARL received approval to discharge continuously on May 12, 2008.

The NORWEGIAN PEARL was built in 2005, is 965 feet long with 15 guest decks, with about a 27-foot draft. There are typically about 2394 passengers and 1100 crew.

Inspection

I arrived and boarded the ship (photo #01) at about 9:28 am and began with introductions and a plan for the day with Matilda Ivanova, Environmental Officer. We then headed to the Engine Control Room (ECR) area and discussed various waste streams, and the discharge protocols. Discharge records were reviewed for black water and gray water discharges, garbage and recycling, oil, and hazardous waste. We then discussed the black water and gray water system in detail. Next, we viewed the black water and gray water system and took samples. We then toured the garbage sorting area and hazardous waste storage. The inspection was then finalized and I disembarked the vessel at about 12:05 pm.

Discharge Types and Protocols:

The latitude and longitude coordinates are recorded in the *Sewage and Graywater Discharge Record Book* and in the deck log. The date, time and location of both the start and the stop of the discharges are recorded, along with port location, effluent type, and volumes. The route that is used stays clear of ½ mile of the shellfish areas listed in the MOU. Only in the case of a safety issue, would they need to enter the area. Discharges are to be stopped in that case. The new requirements for stopping discharges in case of a GI greater than 2% of passengers or crew and for notifying the Washington State Department of Health were well known. There is a protocol in place where the staff captain and the medical staff communicate. There have not been any outbreaks this season. All discharge records that were reviewed appeared to be in compliance with the MOU.

Black water, which includes toilet waste, galley waste and infirmary drains and gray water which includes sink and shower and laundry water is treated with a Scanship advanced wastewater treatment system and is discharged continuously with the exception of the area near shellfish beds.

Screenings and grit as well as the biomass (sewage sludge) from the Scanship system is collected, dried and incinerated along with food waste. Only occasionally is the solid food waste held for discharge outside of 12 nautical miles and outside of MOU waters and the Olympic Coast National Marine Sanctuary. The liquid from the food waste is typically discharged as above. Cooking oil is collected (photo #32) and recycled as biodiesel. When the grease traps are cleaned out, the waste is placed in drums and off-loaded as regulated waste.

Air conditioning condensate is used as technical water.

Oily bilge water is treated with two Marinfloc systems for separating oil. The oily bilge is treated to less than 15 ppm, although the results are typically less than 5 ppm. From the oily water separator, the oil content is again measured in the locked "white box" (photo #26). The treated oily bilge water is then discharged outside of MOU waters and greater than 12 nautical miles.

Potable water that is regularly bunkered. Water is also produced by desalination using a reverse osmosis system and evaporators. The salt that is collected through the production process is sent back to the salt water. A descaler chemical is used on the evaporators and is adjusted for pH before discharge at sea.

Dry cleaning uses PERC which is off-loaded as hazardous waste in Canada. Silver is captured from the photo waste, treated to less than 5 ppm and is off-loaded as regulated waste (photo #34). Some of the X-ray waste is hazardous and off-loaded as such (fixer), while the rest is sent through the silver recovery unit along with the photo waste and off-loaded as regulated waste. Other hazardous wastes include some batteries, paints, mercury filters, some aerosols (punctured), and sharps. Fluorescent bulbs are crushed with a system that removes mercury (photo #33). The bulbs are then off-loaded as regulated waste. Medical, red bag waste is typically incinerated. Narcotics are incinerated and expired medications along with sharps are off-loaded as hazardous waste. All hazardous wastes (photo #35) are off-loaded in Canada (with the exception of the last few weeks of the season – the hazardous waste is being held until repositioning in Miami). Other materials incinerated include paper, food-contaminated cardboard, and oily rags.

Plastics, garbage, and other materials are collected and sorted on a sorting table (photo #29). Most materials are then condensed and recycled on-shore (photo #30). Crushed glass (photo #27), aluminum (photo #28), tin, scrap metal, plastics, cardboard, wood pallets and some paper are all recycled along with other materials. Broken china (photo #31) is off-loaded as well.

Black water and Gray water System (Scanship System):

Black water, which includes toilet waste, galley waste and infirmary drains moves by vacuum to a buffer tank (photo #02). From the collection tanks, it goes to the prescreeners (also known as drum screens) (photos #03 and #04). There are two drum screens which provide pre-screening. Solids from the drum screens go to the sludge tank. Liquid flow from the drum screens then enters the mixing tank where it combines with the gray water (photo #05) consisting of sink, shower, and laundry water. Air and water are added to the mixing tank and it is monitored in-line entering the mixing tank for flow, pH and temperature (photo #06 and #08). From the mixing tank, the liquid moves to the biostep (photos #07 and #10) for biological treatment (biofilm on rotating plastic pieces – 2 tanks in series, air added). A defoamer (photo #09) can be used to control foam.

After the biostep, liquid moves to the flocculation tanks (photo #11). Coagulant is injected (photos #12 and #17) and then polymer is injected (photo #18) in the second cylinder of the flocculation tank. Clarification then occurs via flotation tanks (photo #13). An air and water mixture (photo #16) is added to the bottom of the flotation tanks to keep turbulence at the bottom and to allow the solids to rise to the top, along with the help of the chemical addition. Skimmers on the top (photo #14) skim the solids into a sludge pocket which is then pumped (photo #19) to the sludge tank. Liquid flow then moves to the polishing filters (photos #15 and #20) for ultrafiltration (2 rotating mesh drums). Spray nozzles help move the liquid through the filters. Sediments collected with the filter are sent to a drain tank and then are pumped back to the mixing tank.

Flow then moves to ultraviolet (UV) light disinfection (photo #21). There are three UV units, of which two are typically used in series with 14 bulbs each. The UV unit not being used goes through a cleaning cycle with Metal Bright cleaner and is then rotated in for use. There is typically about one set (14 bulbs) of spare bulbs on board. The UV system is alarmed (photo #25) for bulb failure and intensity at <18 watts per meter squared. Pressure and temperature is also alarmed. At the time of the inspection, the two operating UV units were at 43 W/m² and 60 W/m². The UV sleeves are cleaned by dosing Metal Bright cleaner automatically. Chlorine is available on board (photo #23) as a back-up disinfection system (although hasn't been used). Flow from the UV units is either discharged directly overboard via the discharge port (photo #24), is re-circulated through the Scanship system, or is held for discharge later outside of MOU waters.

Solids from the sludge tank are often combined with food waste and then the material is dried with a dryer and incinerated.

The cruise line uses a system called AMOS for work orders and maintenance. Manufacturer recommendations for maintenance of each piece of equipment is included in the AMOS system which triggers staff when maintenance is required. Scanship also monitors maintenance on the system. Any needed calibrations, cleaning, and other needed maintenance would be included in AMOS. Total suspended solids (TSS) (equivalent to turbidity) is monitored continuously at UV disinfection (photo #22). If TSS exceeds 20 mg/l, the system alarms (photo #25) and staff responds to investigate. At 28 mg/l, the system alarms and switches automatically to hold that discharge. At 30 mg/l, the effluent from the system is shut down. PH is also monitored for adjustments.

There have recently been some higher readings for total suspended solids (TSS) from the Scanship system. The 1st increase is probably linked to cleaning chemicals and the 2nd TSS increase was probably due to mechanical speed issues with the skimmer on the flotation unit. When the readings reached the 20 mg/l threshold, staff was notified and investigated. At 28 mg/l, the discharge valves close temporarily until the TSS goes below 25 mg/l and at 30 mg/l, the discharges were stopped completely. The high TSS water is typically sent back through the treatment system, but as the TSS levels stayed high for a while, the effluent was sent to the holding tanks for discharge outside of MOU waters (and >12 nautical miles).

Samples were taken for Biochemical Oxygen Demand (BOD 5-Day), Total Suspended Solids (TSS), pH, chlorine residual, fecal coliform and ammonia from the combined effluent of the Scanship system after UV disinfection. The sample port was disinfected by heat prior to pulling samples. The samples were put on ice immediately and were transported to AmTest laboratory in Kirkland, Washington that afternoon. Chain of Custody and sampling procedures were followed. All results are in Section F. The results are typical of the results submitted to Ecology thus far for 2008.

Conclusions and Recommendations

The protocols for discharging away from the shellfish beds was very clear.

It is recommended that staff continue to work towards a high functioning wastewater treatment system.

Attachments:

Photographs
Laboratory Report

Copies to:

Randy Fiebrandt, NCL
Matilda Ivanova, NCL
Amy Jankowiak, Ecology
Karen Burgess, Ecology
Mark Toy, Health
Kevin Fitzpatrick, Ecology
Central Files: Norwegian Cruise Line – NORWEGIAN PEARL; WQ 6.1

Section I: Signatures

<u>Name and Signature of Inspector</u>	<u>Agency/Office/Telephone</u>	<u>Date</u>
Amy Jankowiak 	Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	10/16/08
<u>Name and Signature of Reviewer</u>	<u>Agency/Office/Telephone</u>	<u>Date</u>
Kevin C. Fitzpatrick 	Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	10/16/08



PHOTO #:01 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140001
DESCRIPTION: NORWEGIAN PEARL VESSEL, PIER 66,
SEATTLE

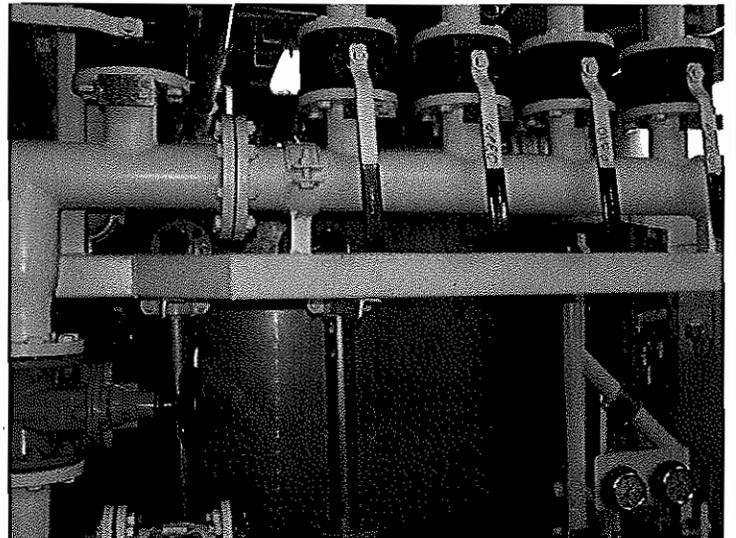


PHOTO #:02 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140002
DESCRIPTION: BLACK WATER BUFFER TANK

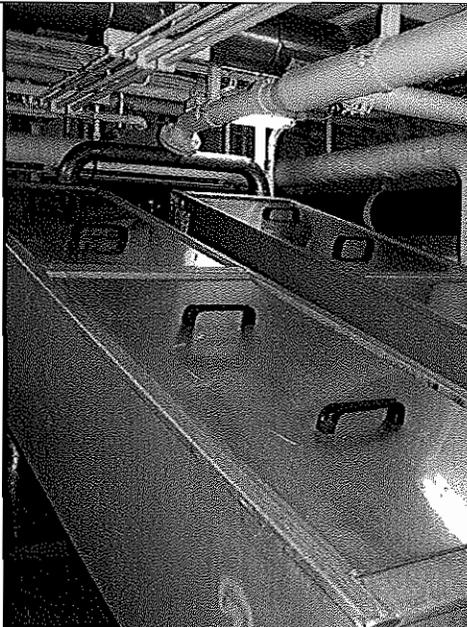


PHOTO #:03 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140003
DESCRIPTION: PRE-SCREENS (DRUM SCREENS)



PHOTO #:04 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140004
DESCRIPTION: INSIDE OF PRE-SCREEN (DRUM SCREEN)



PHOTO #:05 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140005
DESCRIPTION: GRAY WATER PUMPS

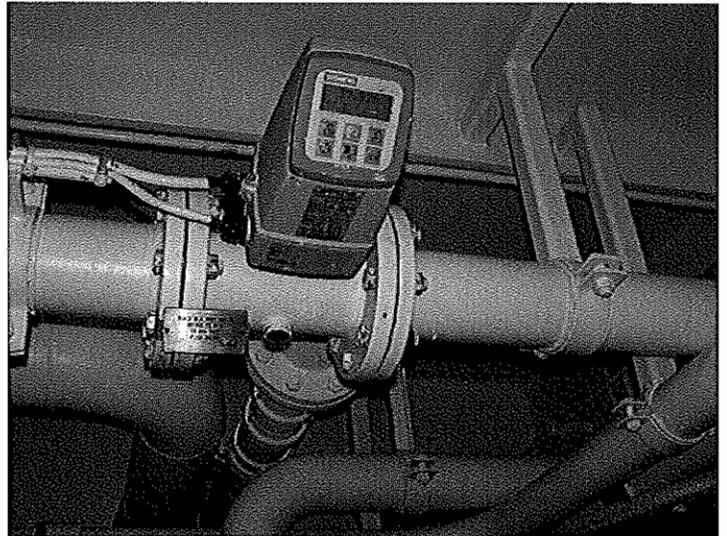


PHOTO #:06 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140006
DESCRIPTION: MIXING TANK FLOW METER

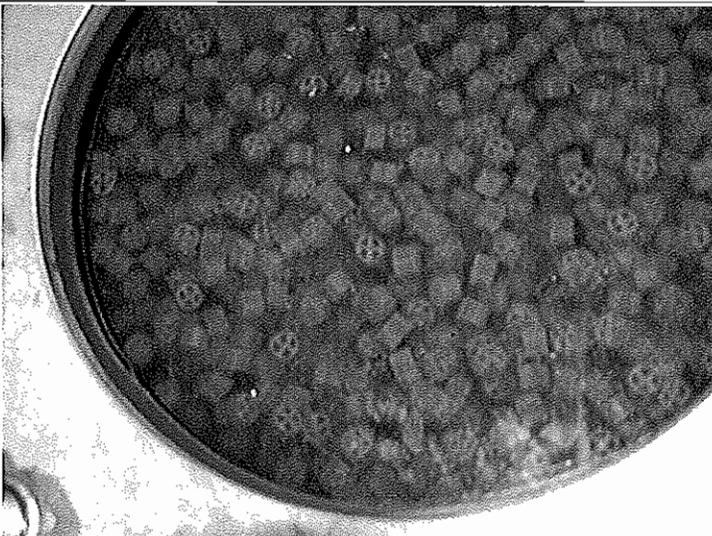


PHOTO #:07 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140007
DESCRIPTION: VIEW OF BIOREACTOR

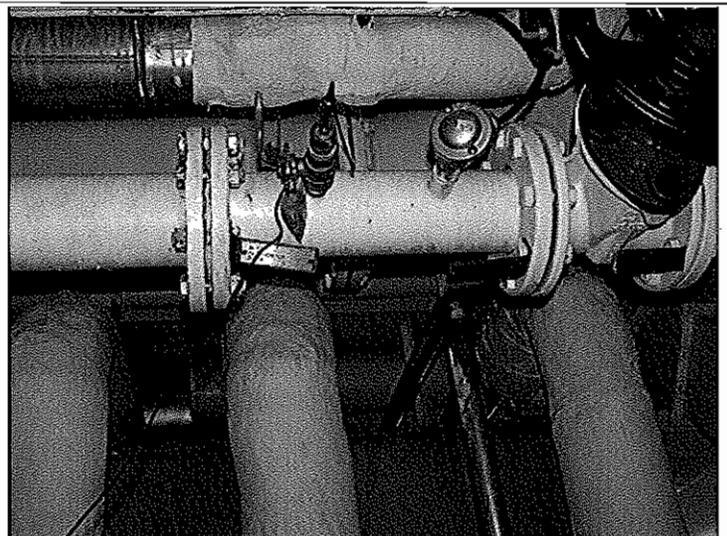


PHOTO #:08 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140008
DESCRIPTION: MIXING TANK PH SENSOR, TEMP SENSORS

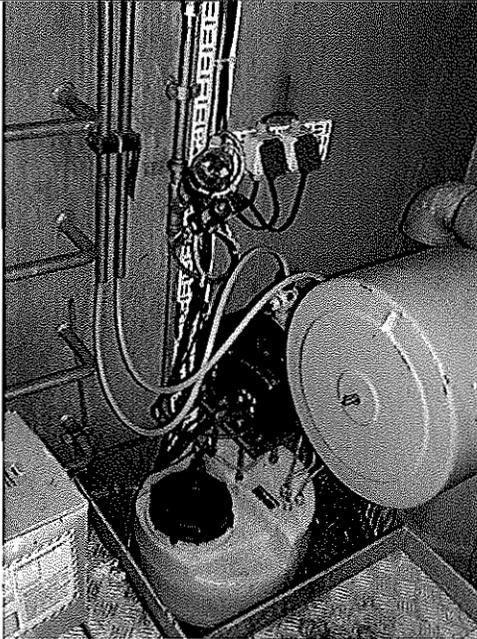


PHOTO #:09 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140009
DESCRIPTION: DEFOAMER ON BOTTOM AND BLOWER ON RIGHT FOR BIOREACTOR



PHOTO #:10 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140011
DESCRIPTION: BIOREACTOR TANK (DANIEL GAZA, ENVIRONMENTAL ENGINEER)



PHOTO #:11 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140013
DESCRIPTION: FLOCCULATION TANKS



PHOTO #:12 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140014
DESCRIPTION: COAGULANT INJECTION

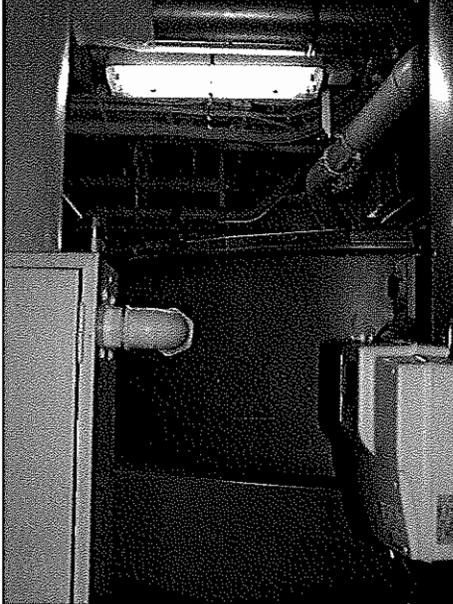


PHOTO #:13 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140015
DESCRIPTION: FLOTATION TANK (STAINLESS STEEL)

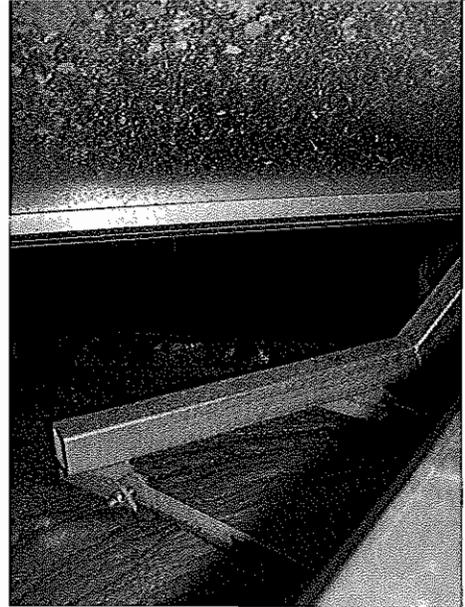


PHOTO #:14 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140016
DESCRIPTION: INSIDE OF FLOTATION TANK

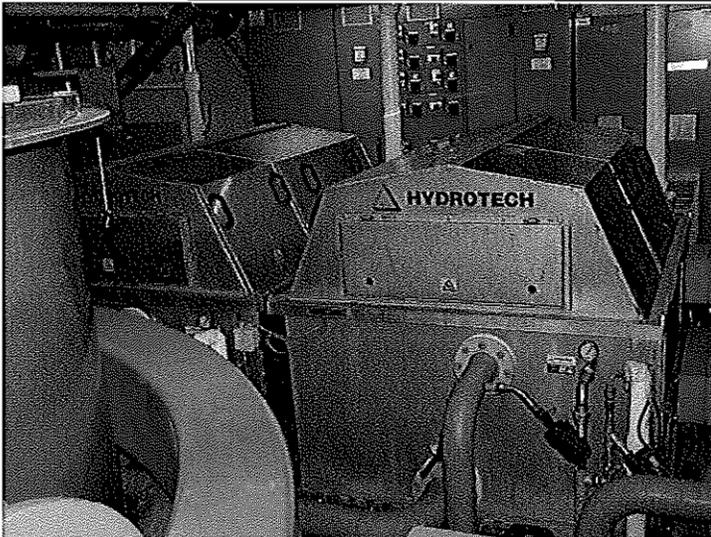


PHOTO #:15 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140017
DESCRIPTION: POLISHING FILTERS

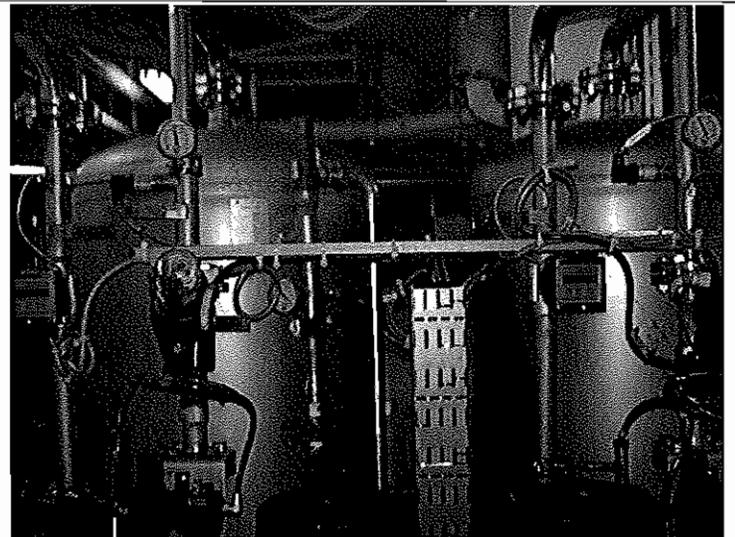


PHOTO #:16 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140018
DESCRIPTION: AIR AND WATER MIXING

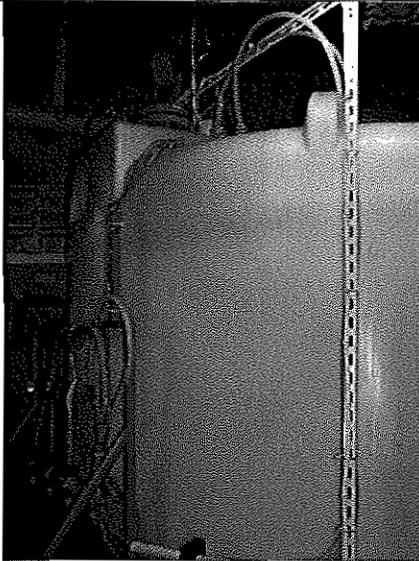


PHOTO #:17 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140019
DESCRIPTION: COAGULANT TANK

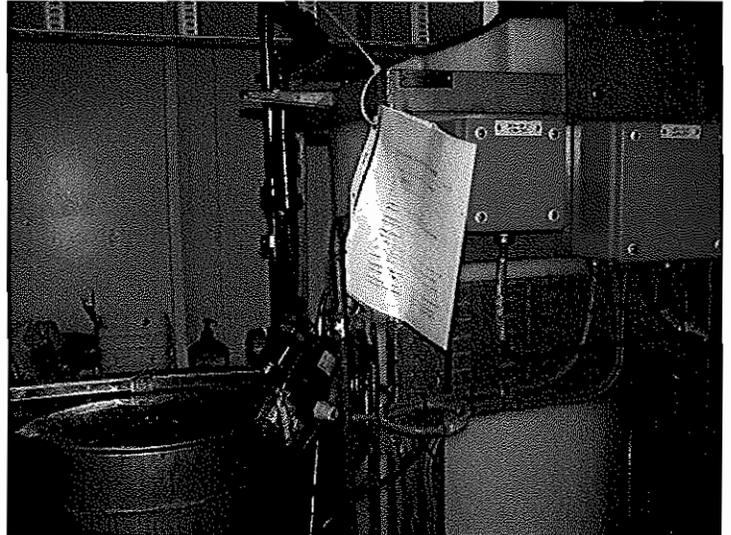


PHOTO #:18 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140020
DESCRIPTION: POLYMER DOSING/TANK



PHOTO #:19 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140021
DESCRIPTION: SLUDGE PUMPS



PHOTO #:20 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140022
DESCRIPTION: POLISHING FILTERS

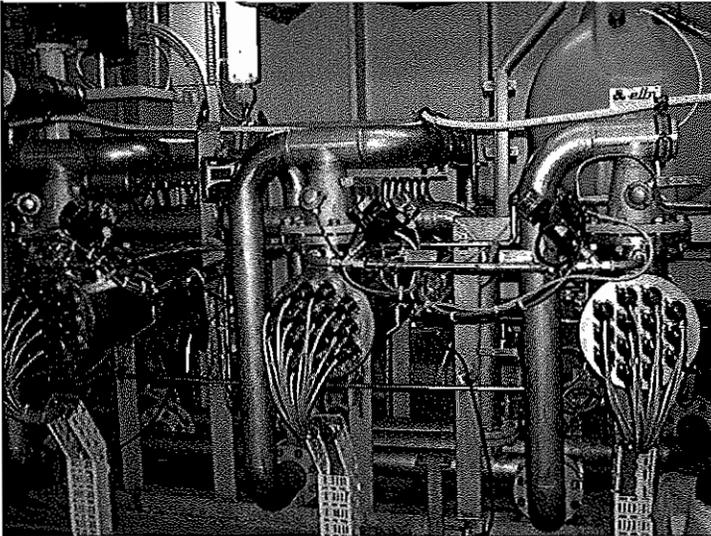


PHOTO #21 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140023
DESCRIPTION: ULTRAVIOLET DISINFECTION SYSTEM

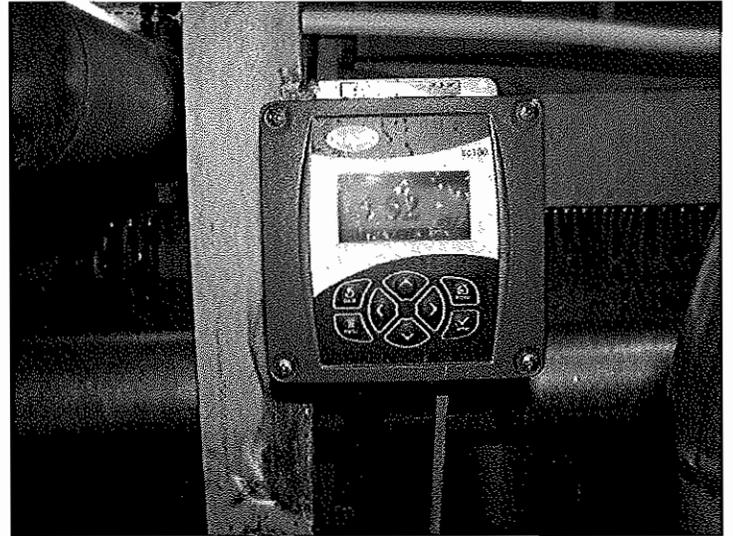


PHOTO #:22 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140024
DESCRIPTION: TSS SENSOR (1.92 MG/L) ON UV EFFLUENT

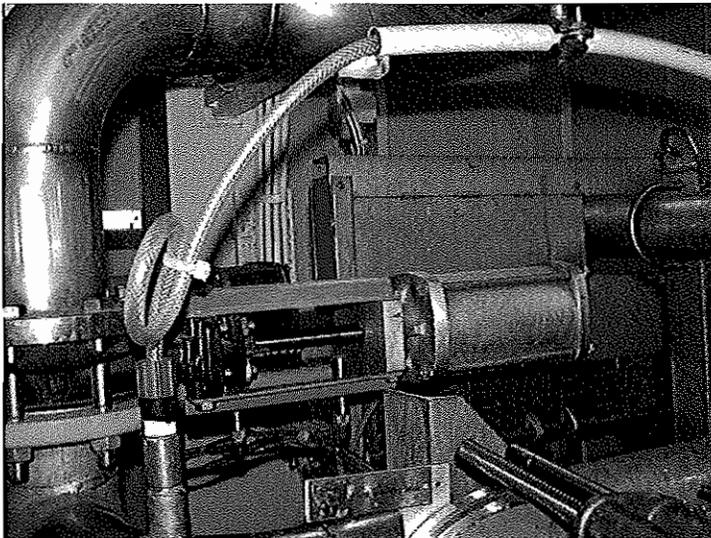


PHOTO #:23 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140025
DESCRIPTION: CHLORINE FOR BACK-UP (HAVEN'T HAD TO USE)



PHOTO #:24 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140026
DESCRIPTION: SCANSHIP EFFLUENT DISCHARGE PORT AND
SAMPLE LOCATION.



PHOTO #:25 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140027
DESCRIPTION: ALARM SETTING SCREEN FOR UV/TSS



PHOTO #:26 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140010
DESCRIPTION: OILY WATER SEPARATOR WHITE BOXES

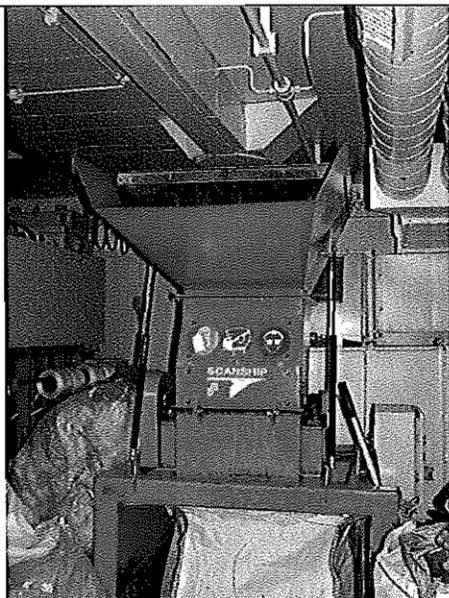


PHOTO #:27 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140028
DESCRIPTION: GLASS CRUSHER

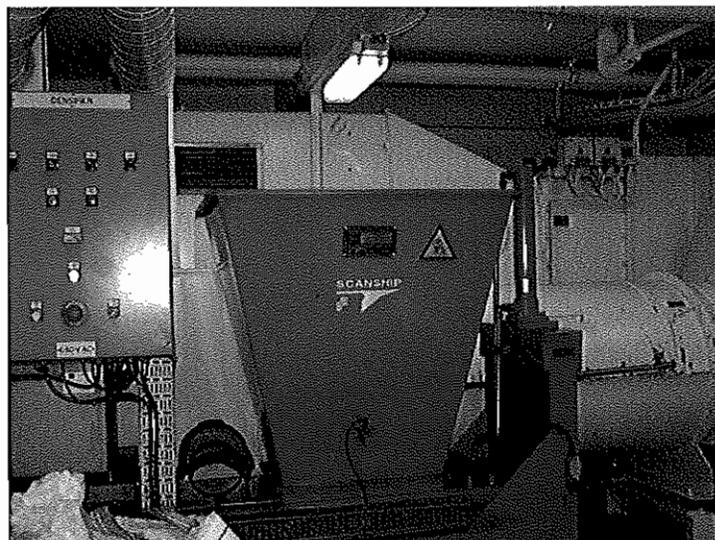


PHOTO #:28 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140029
DESCRIPTION: ALUMINUM CRUSHER

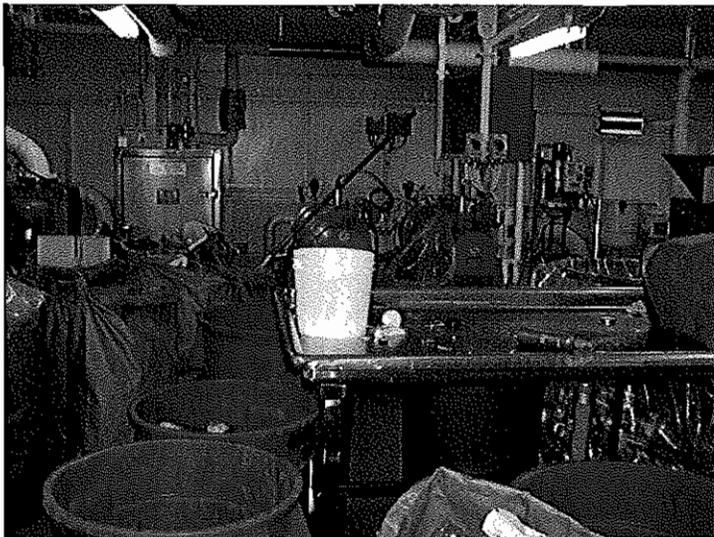


PHOTO #:29 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140030
DESCRIPTION: GARBAGE/RECYCLING SORTING AREA



PHOTO #:30 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140032
DESCRIPTION: COLD STORAGE

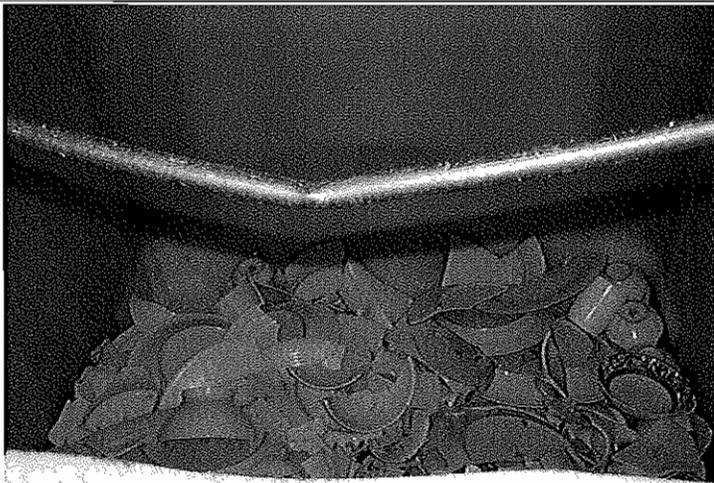


PHOTO #:31 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140033
DESCRIPTION: BROKEN CHINA

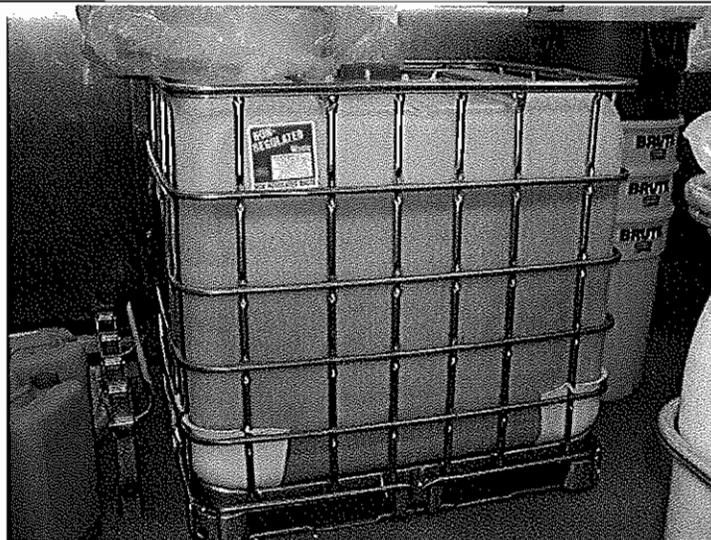


PHOTO #:32 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140034
DESCRIPTION: COOKING OIL

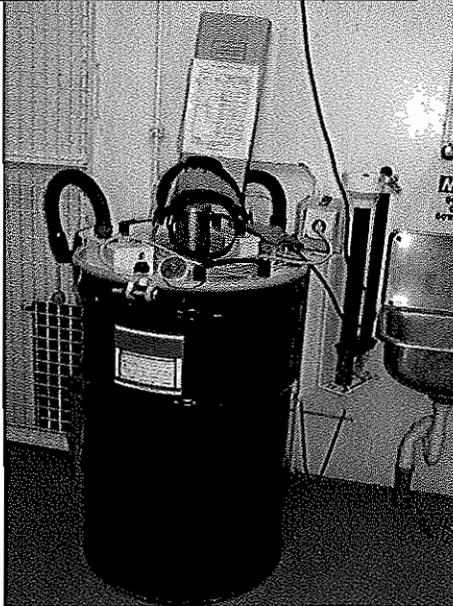


PHOTO #:33 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140035
DESCRIPTION: FLUORESCENT BULB CRUSHER/MERCURY
REMOVAL SYSTEM



PHOTO #:34 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140036
DESCRIPTION: HAZARDOUS WASTE STORAGE – PHOTO WASTE

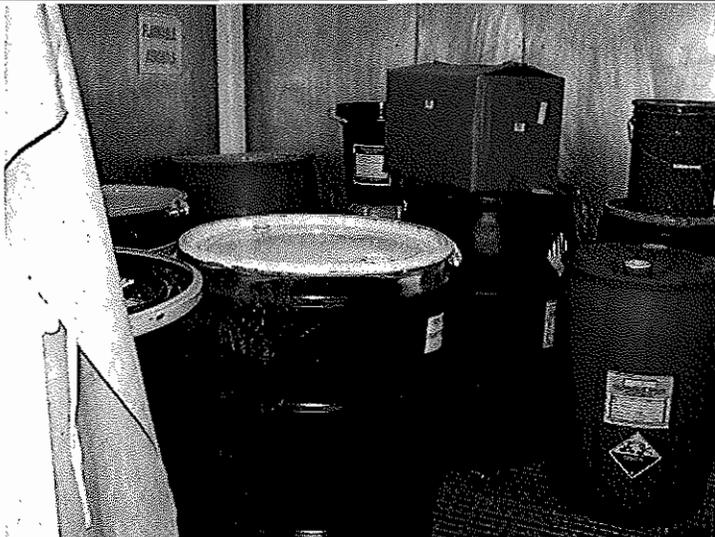


PHOTO #:35 DATE: SEPTEMBER 14, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9140037
DESCRIPTION: HAZARDOUS WASTE STORAGE

Am Test Inc.
 13600 NE 126TH PL
 Suite C
 Kirkland, WA 98034
 (425) 885-1664
 www.amtestlab.com



Professional
 Analytical
 Services

ANALYSIS REPORT

Department of Ecology
 3190 106th Ave Se
 Bellevue, WA 98008
 Attention: Amy Jankowiak
 Project Name: Norwegian Pearl

Date Received: 09/14/08
 Date Reported: 10/ 3/08

AMTEST Identification Number 08-A012781
 Client Identification NORPEARL- Eff
 Sampling Date 09/14/08, 11:46
 All results reported on an as received basis.

Microbiological

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fecal Coliforms	< 1	CFU/100 ml		1.	SM 9222D	KF	09/14/08 14:00

Conventionals

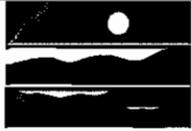
PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	6.75	unit			EPA 150.1	KF	09/14/08
Chlorine Residual	0.12	mg/l		0.10	EPA 330.5	SL	09/15/08
Total Suspended Solids	5.0	mg/l		1.0	SM 2540D	SL	09/16/08

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
BOD	< 10	mg/l		10.	SM 5210B	KF	09/14/08

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	26.	mg/l		0.005	EPA 350.1	TS	09/25/08



State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	MERCURY	Date:	September 22, 2008
Vessel Operator:	Celebrity Cruises	Entry Time:	9:06 AM
Vessel Type	Passenger Ship	Exit Time:	11:44 AM
Location:	Terminal 66, Seattle	Notification (name & date):	Rich Pruitt; September 16, 2008
On-board contact(s):	Nikolas Asproudas, Environmental Officer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	~1870/~909		

The MERCURY arrived on May 22nd, 2008 at the Port of Seattle to begin the 2008 cruise season. The vessel was here once in May, then returned to Seattle for a handful of calls in April and then returned again in September for shorter 3-4 day cruises between Washington and Canada to finish the season. The vessel has been holding effluent and not discharging in MOU waters since the beginning of the season.

Biopure is a marine sanitation device including aeration, settling, and chlorination for blackwater only. This system is run at all times.

Rochem Advanced Waste Water Purification System: The Rochem combines blackwater from the Biopure system and graywater and includes prefiltration, reverse osmosis in two stages with aeration and UV disinfection. The Rochem system is only run for a couple of hours now and then to maintain functionality. There is not enough capacity in the AWTS to treat all of the wastewater.

Section B: Areas Evaluated

<input checked="" type="checkbox"/>	Black/Gray wastewater system	<input checked="" type="checkbox"/>	Residual solids	<input checked="" type="checkbox"/>	Records/Reports	<input checked="" type="checkbox"/>	Hazardous Waste/Solid Waste	<input type="checkbox"/>	Sampling/Monitoring
<input checked="" type="checkbox"/>	Discharge locations	<input checked="" type="checkbox"/>	Operations & Maintenance	<input checked="" type="checkbox"/>	Sludge Handling/Disposal	<input checked="" type="checkbox"/>	Oily bilge water	<input checked="" type="checkbox"/>	Other

Section C: For vessels discharging ≥ 1nm from berth and ≥ 6 knots only [2.1.3(A)]

<input type="checkbox"/>	Schematics match black/gray wastewater system
<input type="checkbox"/>	Operations as described in submitted documentation
<input type="checkbox"/>	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly
	<u>Turbidity or equivalent :</u> Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if high turbidity occurs
<input type="checkbox"/>	Disinfection system operated and maintained properly
	Disinfection System:

Section D: For vessels discharging continuously [2.1.3(B)]

<input type="checkbox"/>	Schematics match black/gray wastewater system
<input type="checkbox"/>	Operations as described in submitted documentation

<input type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring	
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly	
	<u>Turbidity or equivalent</u> : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	
<input type="checkbox"/>	Disinfection immediately prior to discharge	
<input type="checkbox"/>	Disinfection system operated and maintained properly	
	Disinfection System:	

Section E: General (Approved to Discharge)

<input type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tye Shoal)	
<input type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	
<input type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	
<input type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	
<input type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	
<input type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	
<input type="checkbox"/>	Immediate notifications to Health for GI >2% passengers or crew	

Section F: General

<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Residual solids are incinerated.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	Hazardous waste collected is being landed ashore in Canada. Records reviewed showed no off-loads in Washington State.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	Hazardous waste collected is being landed ashore in Canada. Records reviewed showed no off-loads in Washington State.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste appeared to be managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm (and typically less than 5 ppm) and at greater than 12 nautical miles.

Other:

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program, conducted the inspection of the Celebrity Cruises MERCURY on September 22, 2008. The main contact on board the MERCURY included Nikolas Asproudas, Environmental Officer. Prior notification of the visit was given on September 16, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. The MERCURY has not requested and is not approved for discharge in Washington State.

Inspection

I arrived and boarded the ship (photo #01) at 9:06 am and began with introductions and a plan for the day. We then discussed discharge protocols for various waste streams, reviewed navigation/discharge plans for the short 3-4 day cruises and notification procedures. Discharge records were reviewed for black water and gray water discharges and showed no discharges in Washington waters from the beginning of the cruise season to date. Records were also reviewed for garbage and recycling. We then took a look at the garbage and recycling areas. Next, we headed down to the Biopure system to view the components. We also toured some of the discharge ports (photos #28, #29, & #31) and the oily water separators. I then concluded with a de-briefing and disembarked the vessel at about 11:44 am.

Discharge Protocols:

The MERCURY has not requested, and is not approved to discharge in waters subject to the MOU. All blackwater is treated with a marine sanitation device (MSD), Biopure, and is discharged outside of MOU waters. Currently, untreated graywater is sent to a holding tank and discharged outside of MOU waters along with the MSD treated blackwater. This season, the vessel is running three or four day cruises between Seattle and Canada, and is discharging all blackwater and graywater in pre-designated areas in Canadian waters near Victoria, in Canada (photo #04) at the north end of the Strait of Georgia (photo #03), or off of Washington's coast west of the entrance to the Strait of Juan de Fuca (outside of 12 nautical miles and outside of the Olympic Coast National Marine Sanctuary – photo #02). All discharges are logged in the *Sewage and Graywater Discharge Record Book* based on the coordinates from the bridge.

The Captain of the vessel requested that I look at the plotted discharge location west of the entrance to the Strait of Juan de Fuca to confirm that the locations are allowed by the MOU. As the location is outside of the MOU waters and outside of the Olympic Coast National Marine Sanctuary, the location appears to be compliant with the MOU. The Environmental Officer and vessel staff conducted extensive pre-planning accounting for the vessels itinerary, route, and holding tank capacity in order to assure that all discharges would take place in accordance with regulations and the MOU.

Sewage residuals (sludge or biomass) are strained and incinerated. Food waste is pulped (photo #11) and then either incinerated or discharged at greater than 12-nautical miles from shore. The galley water goes to the graywater holding tanks. Some of the food waste such as bones, meat, and fruit with heavy skins (photo #14) cannot be pulped and is therefore mixed with some cardboard material and incinerated. Cooking oil is collected to tanks (photo #15) and incinerated about every 20 days.

Laundry water is sent to the graywater holding tanks along with shower and sink water from accommodations and throughout the vessel. The graywater is not treated, but held for discharge outside of MOU waters. Spa/Jacuzzi water is discharged outside of MOU waters and at greater than four nautical miles. The vessel bunkers for potable water periodically and produces most by desalinization with evaporators and a reverse osmosis system. A descaler is used for the evaporators. Ballast water can be treated with a ballast treatment system (photo #27), but the vessel does not need to exchange ballast near the MOU waters.

A reduction of laundry water usage and other water conservation efforts have been made in order to minimize the wastewater produced and to allow for longer holding times of the wastewater.

Oily bilge water is treated with the Turbulo (photo #21) and Marinfloc systems (oily water separators – photo #22). There is no white box for the systems.

The drains from the medical facility go to the blackwater system (photo #23). Sharps are collected in sharps containers, are then boxed and landed ashore as biohazard waste. Red bag waste from the medical facility is incinerated. Expired medications and narcotics are logged, and with witnesses incinerated outside of 12 nautical miles.

For all discharges, the bridge first confirms that they are in a proper discharging location and then contacts the engine control room to open the valves. The discharge ports are locked and only the key staff have the keys.

Dry cleaning currently uses Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste. Photo waste is

treated to less than 5 ppm through silver recovery along with x-ray waste. Fluorescent light bulbs are crushed with the bulb eater with mercury vapor removal (photo #13). Materials such as paint, batteries, fluorescent bulb waste, photo/x-ray waste and oily sludge are landed ashore in Canada as hazardous waste. All hazardous waste records showed that all off-loads occurred outside of Washington State.

Materials such as aluminum (photo #10), cardboard (photo #08), paper, glass (photos #07 & #09), plastics (photo #16), scrap metal and electronics are recycled (photo #17). The vessel has improved its recycling percentages from about 10 percent in 2006 to about 70 percent in 2008. The recycled material is usually landed ashore in Vancouver, Canada or Victoria, Canada. Some papers, food-contaminated cardboard, some plastics, some biohazardous materials, some food waste, oily rags, and sewage residuals are incinerated (photos #12 & #30).

Notifications numbers were posted on the bridge (photo #05) for both MOU non-compliance and oil discharges. The MOU non-compliance notification sheet is the most recent version including the numbers for the Washington State Department of Health. A copy of the most recent version of the MOU was on-board and available.

Blackwater and Graywater Systems:

The marine sanitation device (MSD), Biopure, operates by first collecting blackwater into a storage collection tank (photo #24). The wastewater then flows into the Biopure system (four separate identical units) by suction. The system (photo #18) includes aeration, pH adjustment, some settling by addition of polymer, and chlorination for disinfection all in one tank partially divided. Solids cleaned out of the tank are strained and incinerated periodically. Effluent from the Biopure system is sent to a holding tank prior to discharge (or is sent to the AWTS if operating). Staff take on-board samples (photo #19) for COD, TSS, pH and chlorine about weekly for process control.

The advanced wastewater treatment system (AWTS) Rochem, is currently only turned on for a couple of hours to maintain functionality. The vessel is not certified or approved this year for discharge in Alaska.

Samples were not taken, as the vessel does not discharge in MOU waters.

Conclusions and Recommendations

Mr. Asproudas, the Environmental Officer, was very knowledgeable of the wastewater system and other environmental systems and protocols.

The increased attention to minimization of waste is impressive. The increased recycling volumes and decreased water usage shows great responsibility towards reducing waste.

The inspections that occurred in 2006 of the MERCURY vessel yielded the discovery of unauthorized discharges and a fine for the company. The inspection on October 8, 2007 and September 22, 2008 showed a great deal of improvement with understanding the locations of waters of the state, waters of the MOU, and discharge protocols. The Environmental Officer and vessel staff conducted extensive pre-planning accounting for the vessels itinerary, route, and holding tank capacity in order to assure that all discharges would take place in accordance with regulations and the MOU.

At the end of the 2006 season, Celebrity Cruises stated that they would likely install a Hamworthy Membrane Bioreactor advanced wastewater treatment system on board the MERCURY that would have the capacity to treat all of the wastewater produced. A test installation was done on another Celebrity Cruises vessel, but due to technical problems, the Line is reevaluating the technology and configuration. This vessel may not return to this route next season.

Attachments:

Photographs

Copies to:

Rich Pruitt, RCCL

Nikolas Asproudas, MERCURY EO

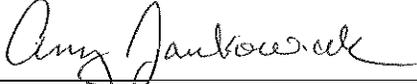
Amy Jankowiak, Ecology

Kevin Fitzpatrick, Ecology

Mark Toy, Dept. of Health

Central Files: Celebrity Cruises – MERCURY; WQ 6.1

Section I: Signatures

<u>Name and Signature of Inspector</u> Amy Jankowiak 	<u>Agency/Office/Telephone</u> Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	<u>Date</u> 9/29/08
<u>Name and Signature of Reviewer</u> Kevin C. Fitzpatrick 	<u>Agency/Office/Telephone</u> Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	<u>Date</u> 9/29/08

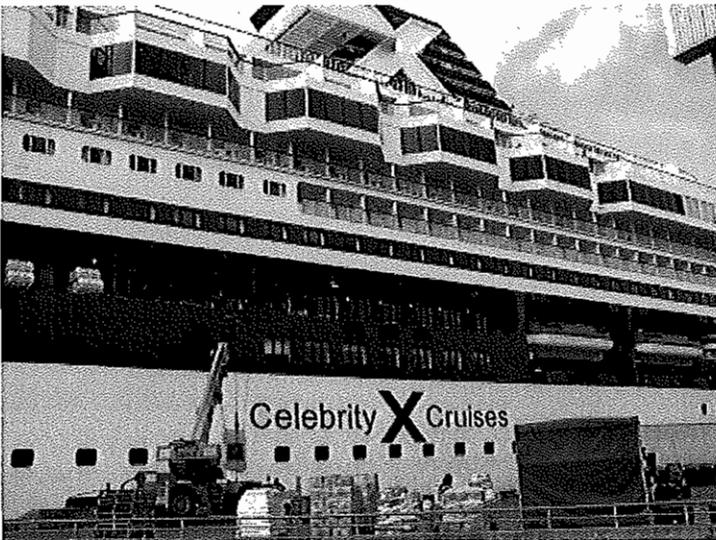


PHOTO #:01 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220046
DESCRIPTION: MERCURY VESSEL, SEATTLE

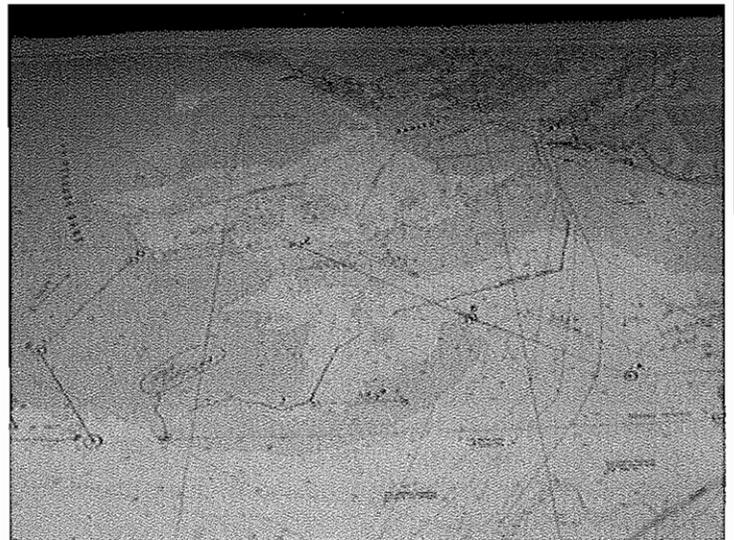


PHOTO #:02 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220012
DESCRIPTION: MAPS SHOWING DISCHARGE LOCATIONS – WEST
OF STRAIT OF JUAN DE FUCA

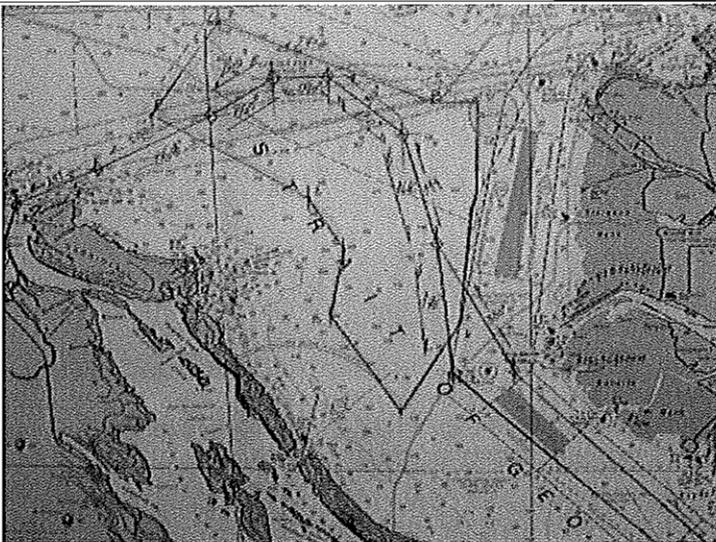


PHOTO #:03 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220014
DESCRIPTION: MAPS SHOWING DISCHARGE LOCATIONS – NORTH
END OF STRAIT OF GEORGIA

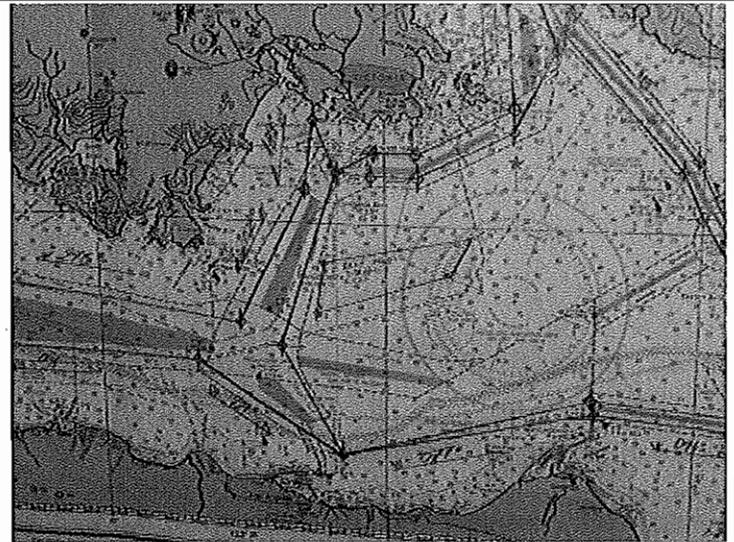


PHOTO #:04 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220015
DESCRIPTION: MAPS SHOWING DISCHARGE LOCATIONS – SOUTH
END OF VICTORIA

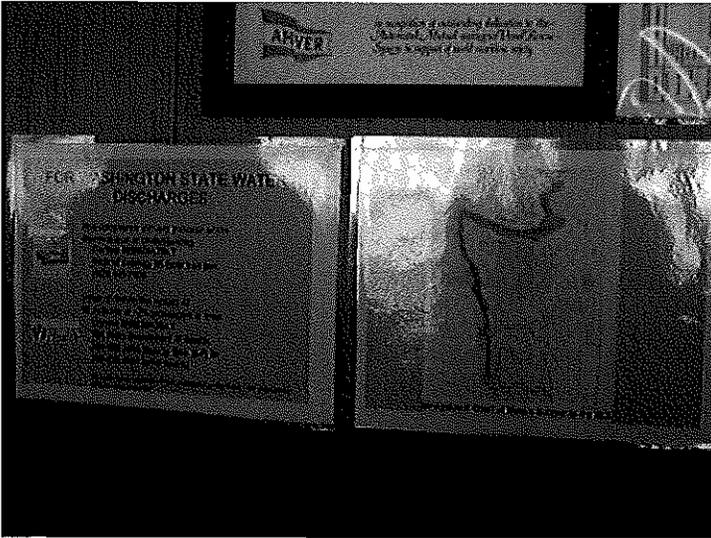


PHOTO #:05 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220013
DESCRIPTION: NOTIFICATION PLACARD AND WASHINGTON/MOU
WATERS MAP ON BRIDGE



PHOTO #:06 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220016
DESCRIPTION: GARBAGE/RECYCLING SORTING AREA



PHOTO #:07 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220017
DESCRIPTION: GLASS SORTING AREA

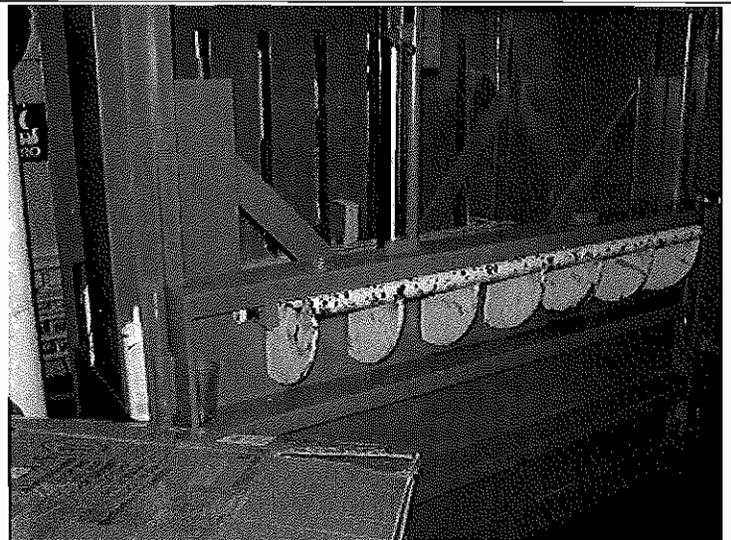


PHOTO #:08 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220018
DESCRIPTION: CARDBOARD COMPACTOR

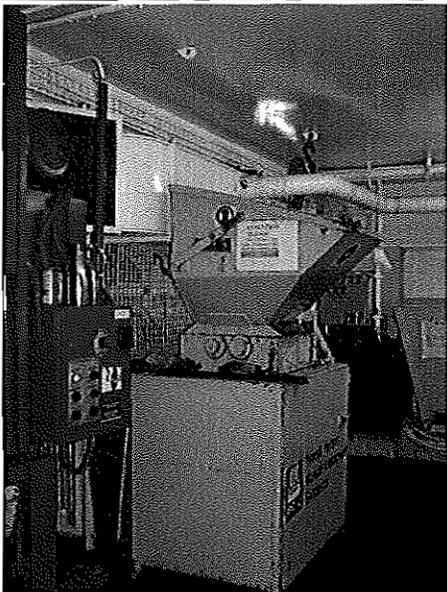


PHOTO #:09 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220019
DESCRIPTION: GLASS CRUSHER



PHOTO #:10 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220020
DESCRIPTION: CAN COMPACTOR

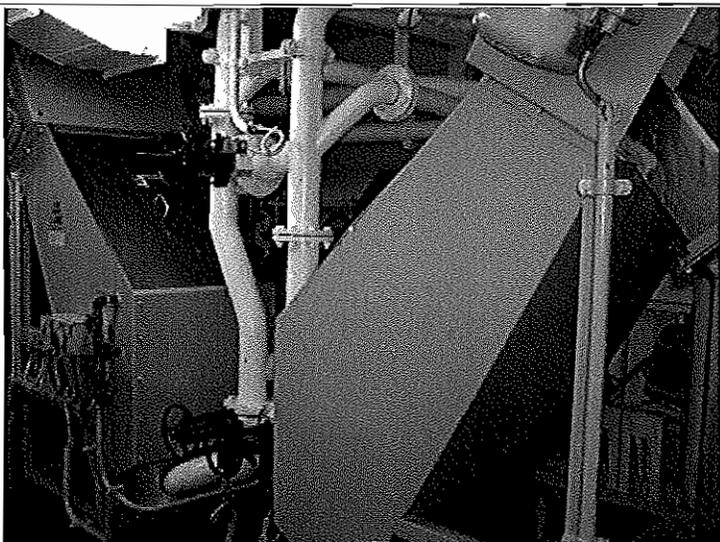


PHOTO #:11 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220021
DESCRIPTION: FOOD EXTRACTORS



PHOTO #:12 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220022
DESCRIPTION: INCINERATOR MATERIAL

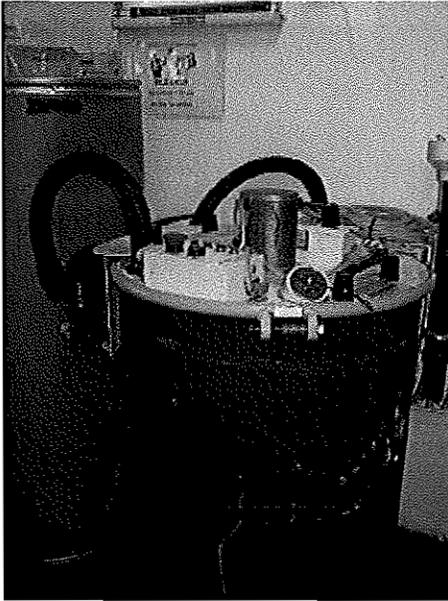


PHOTO #:13 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220023
DESCRIPTION: FLUORESCENT BULB CRUSHER/MERCURY
REMOVAL SYSTEM

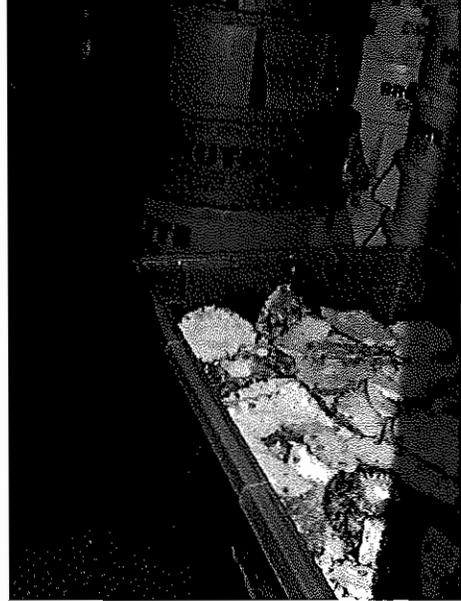


PHOTO #:14 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220024
DESCRIPTION: COLD STORAGE – FOOD WASTE FOR
INCINERATION

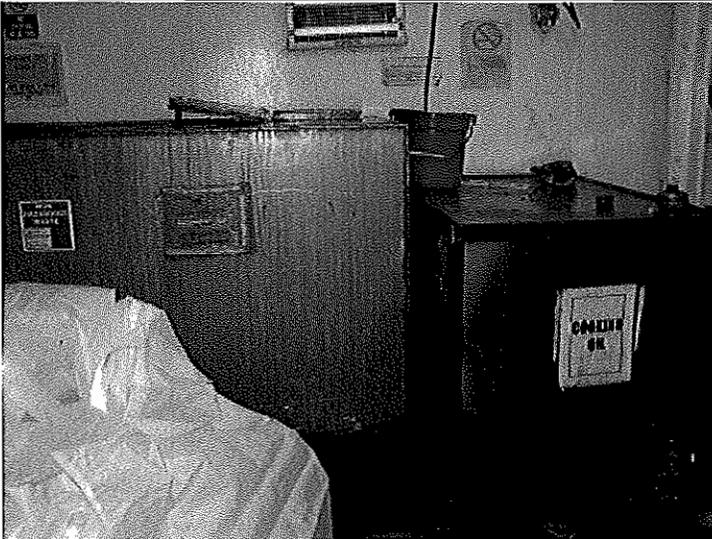


PHOTO #:15 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220025
DESCRIPTION: COOKING OIL STORAGE



PHOTO #:16 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220026
DESCRIPTION: PLASTIC RECYCLABLES FOR OFF-LOADING



PHOTO #:17 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220027
DESCRIPTION: RECYCLABLES FOR OFF-LOADING

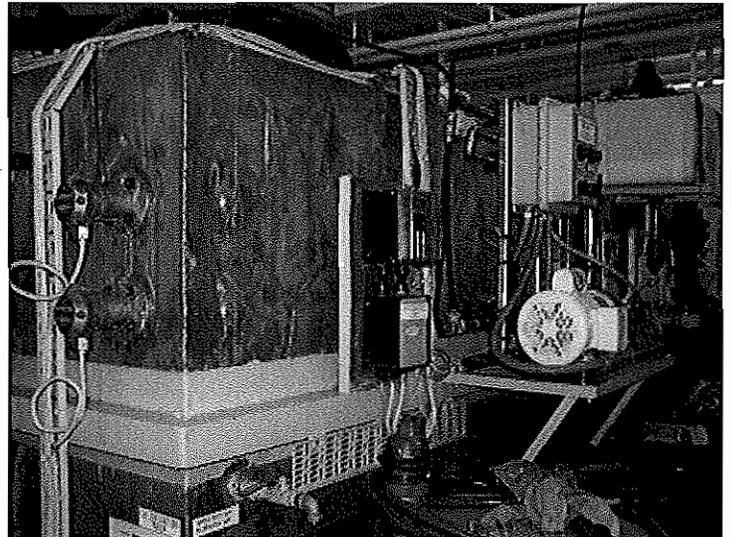


PHOTO #:18 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220028
DESCRIPTION: MARINE SANITATION DEVICE (1 OF 4)

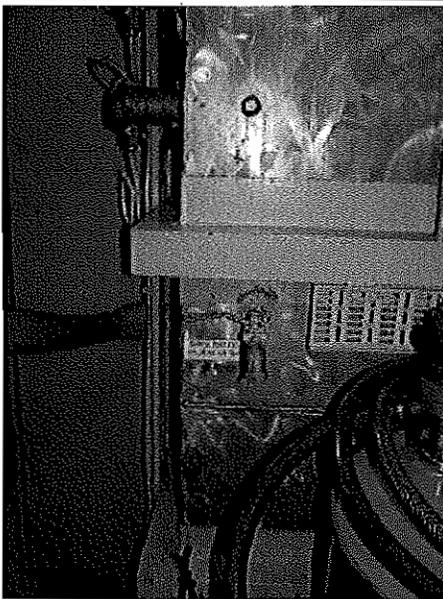


PHOTO #:19 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220029
DESCRIPTION: MARINE SANITATION DEVICE SAMPLING POINT



PHOTO #:20 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220030
DESCRIPTION: MARINE SANITATION DEVICE - BLACKWATER VIEWING LINE

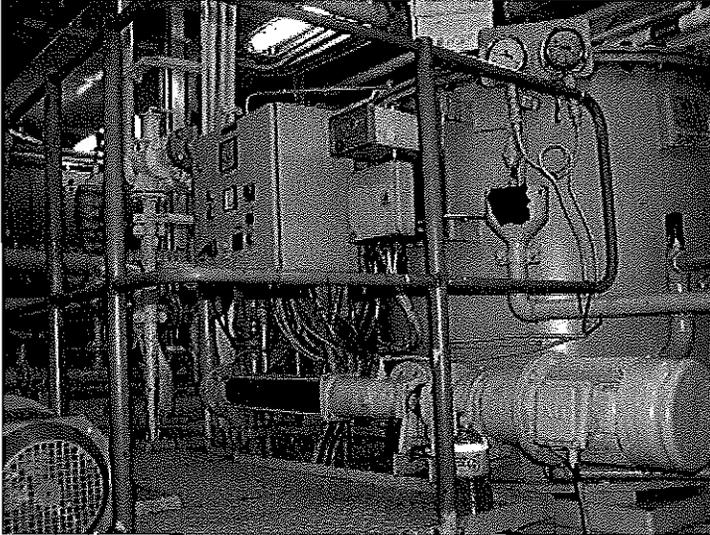


PHOTO #:21 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220031
DESCRIPTION: OILY WATER SEPARATOR (TURBULO)



PHOTO #:22 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220032
DESCRIPTION: OILY WATER SEPARATOR (MARIN FLOC)

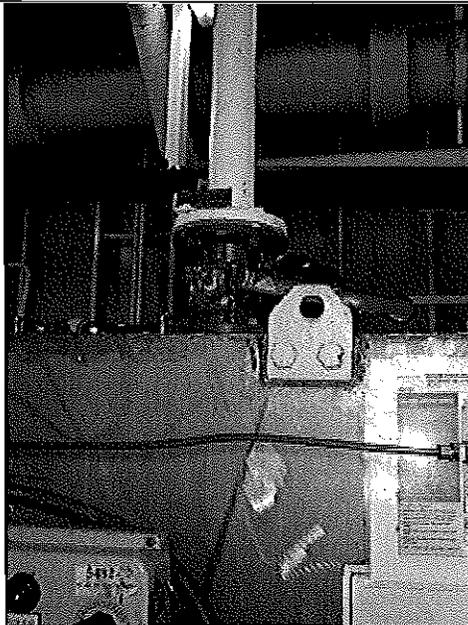


PHOTO #:23 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220033
DESCRIPTION: MARINE SANITATION DEVICE (MEDICAL WASTE
ENTERS - RED)

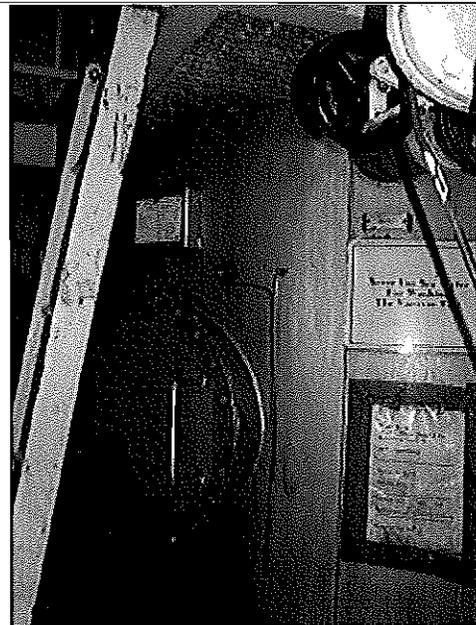


PHOTO #:24 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220034
DESCRIPTION: VACUUM UNIT FOR BLACKWATER

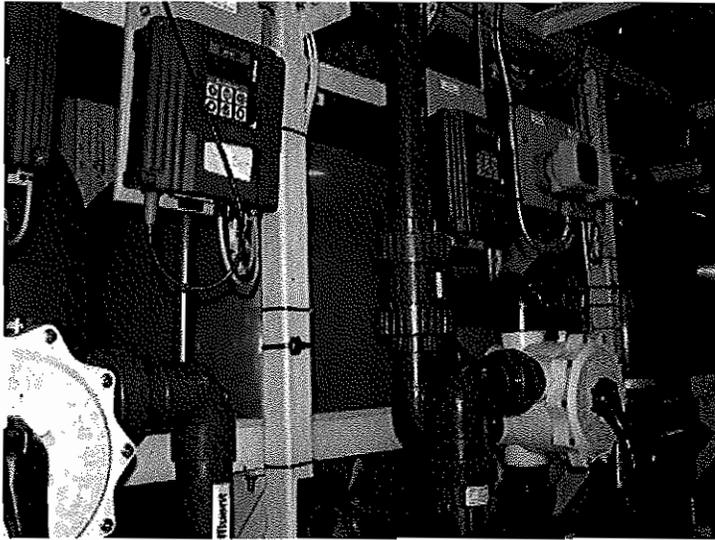


PHOTO #:25 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220035
DESCRIPTION: REVERSE OSMOSIS SYSTEM FOR WATER
PRODUCTION

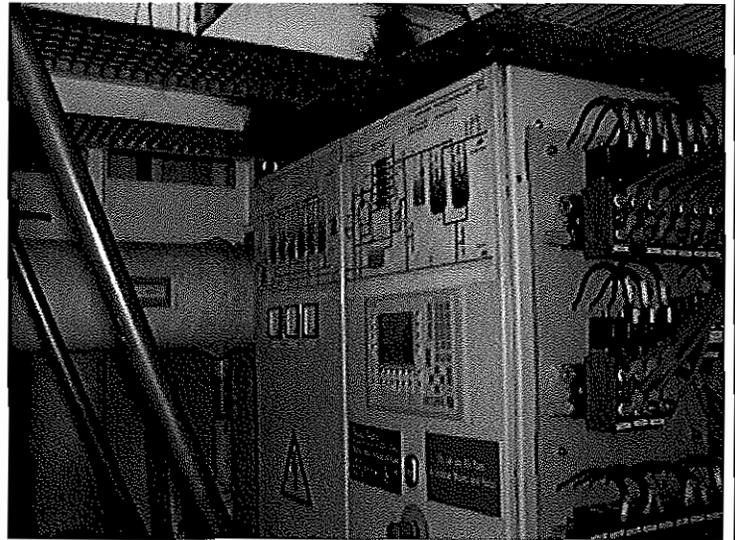


PHOTO #:26 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220036
DESCRIPTION: REVERSE OSMOSIS SYSTEM FOR WATER
PRODUCTION

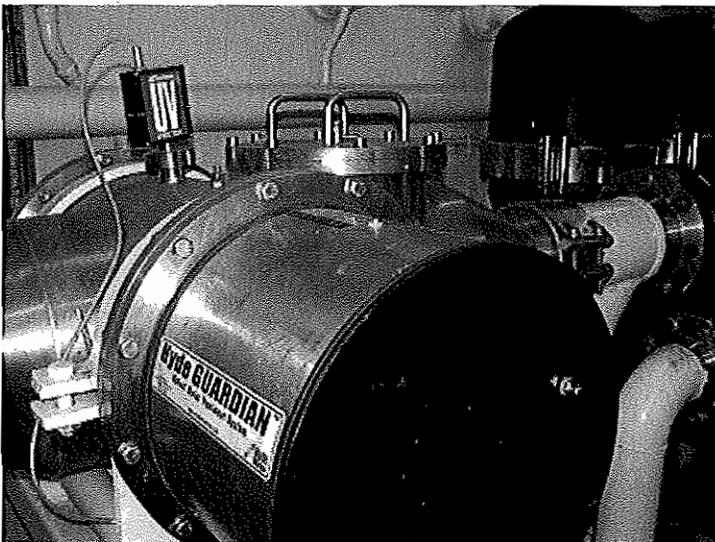


PHOTO #:27 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220039
DESCRIPTION: BALLAST WATER SYSTEM

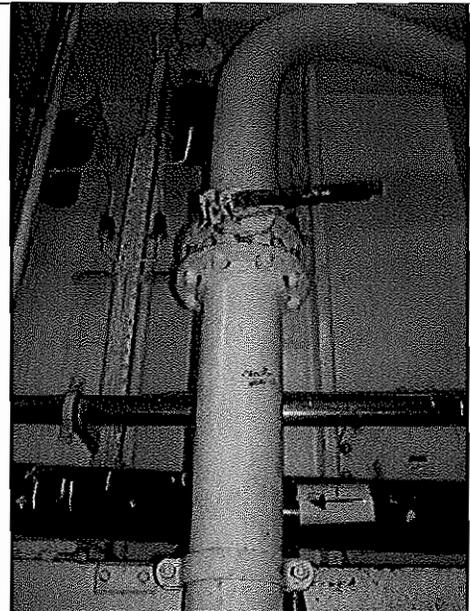


PHOTO #:28 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220040
DESCRIPTION: DISCHARGE VALVE

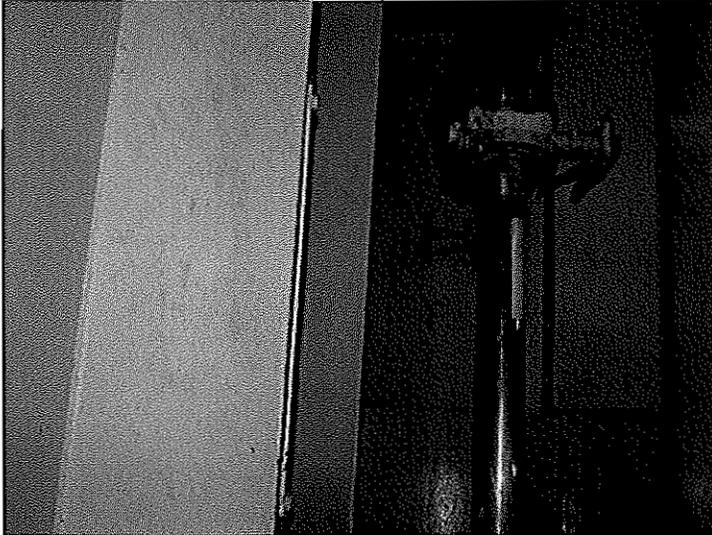


PHOTO #:29 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220041
DESCRIPTION: DISCHARGE PORT



PHOTO #:30 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220044
DESCRIPTION: INCINERATORS

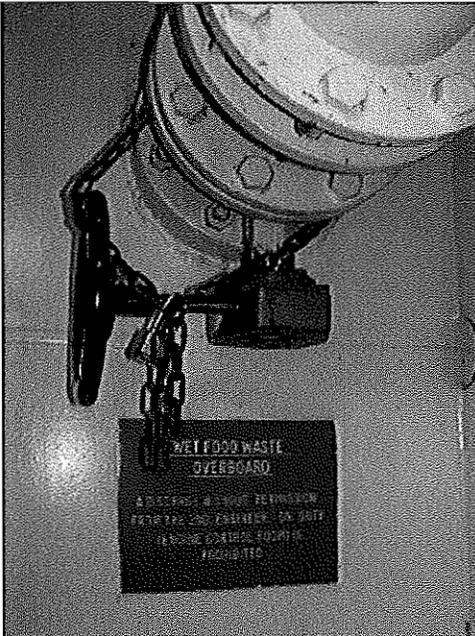
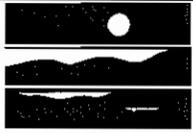


PHOTO #:31 DATE: SEPTEMBER 22, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: P9220045
DESCRIPTION: FOOD WASTE DISCHARGE PORT



State of Washington Department of Ecology
Cruise Ship Memorandum of Understanding, Cruise Operations in Washington State Inspection Report

Northwest Regional Office
 3190 160th Ave SE
 Bellevue, WA 98008
 Phone: (425) 649-7000 Fax: (425) 649-7098

Section A: General Information

Vessel Name:	MILLENNIUM	Date:	October 1, 2008
Vessel Operator:	Celebrity Cruises	Entry Time:	10:05 AM
Vessel Type	Passenger Ship	Exit Time:	11:50 AM
Location:	Terminal 66, Seattle	Notification (name & date):	Rich Pruitt; September 26, 2008
On-board contact(s):	Ronald Raasch, Environmental Officer		
Inspector(s):	Amy Jankowiak, Department of Ecology, Water Quality Program		
# passengers/crew:	~1950/~999		

The MILLENNIUM made four port calls to Seattle, on May 8th, May 22nd, September 21st, and October 1st. The first couple of calls were on route to Alaska, and the last couple of calls were for shorter 3-4 day cruises between Canada and Washington. The rest of the season, the vessel's route is between Vancouver, B.C. and Alaska. The vessel has been holding effluent and not discharging in MOU waters for all of the calls in MOU waters this season.

Section B: Areas Evaluated

<input checked="" type="checkbox"/>	Black/Gray wastewater system	<input checked="" type="checkbox"/>	Residual solids	<input checked="" type="checkbox"/>	Records/Reports	<input checked="" type="checkbox"/>	Hazardous Waste/Solid Waste	<input type="checkbox"/>	Sampling/Monitoring
<input checked="" type="checkbox"/>	Discharge locations	<input checked="" type="checkbox"/>	Operations & Maintenance	<input checked="" type="checkbox"/>	Sludge Handling/Disposal	<input checked="" type="checkbox"/>	Oily bilge water	<input checked="" type="checkbox"/>	Other

Section C: For vessels discharging ≥ 1 nm from berth and ≥ 6 knots only [2.1.3(A)]

<input type="checkbox"/>	Schematics match black/gray wastewater system
<input type="checkbox"/>	Operations as described in submitted documentation
<input type="checkbox"/>	Daily 24-hour continuous monitoring for turbidity or equivalent monitoring
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly
	Turbidity or equivalent : Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if high turbidity occurs
<input type="checkbox"/>	Disinfection system operated and maintained properly
	Disinfection System:

Section D: For vessels discharging continuously [2.1.3(B)]

<input type="checkbox"/>	Schematics match black/gray wastewater system
<input type="checkbox"/>	Operations as described in submitted documentation
<input type="checkbox"/>	Daily 24-hour continuous turbidity or equivalent monitoring
<input type="checkbox"/>	Turbidimeter or equivalent monitoring equipment functioning properly
	Turbidity or equivalent :

	Last calibration – Trigger level for early alarm: Trigger level for shutdown: Recorded turbidity/equivalent levels above triggers:	
<input type="checkbox"/>	Auto shut down or operational controls to insure system shut down if a high turbidity occurs	
<input type="checkbox"/>	Disinfection immediately prior to discharge	
<input type="checkbox"/>	Disinfection system operated and maintained properly	
	Disinfection System: .	

Section E: General (Approved to Discharge)

<input type="checkbox"/>	No discharges within ½ mile from shellfish beds/protocol (President's Point, Apple Tree Cove, Tyee Shoal)	
<input type="checkbox"/>	Discharges immediately stopped when high turbidity occurs	
<input type="checkbox"/>	Immediate notifications made to Health for disinfection system upset	
<input type="checkbox"/>	Sampling conducted 2/month, 1/month in Seattle (BOD, TSS, fecal coliform, pH, chlorine residual)	
<input type="checkbox"/>	Whole Effluent Toxicity Testing 1 per 2 years (homeported) or once/40 calls for continuous	
<input type="checkbox"/>	Discharges immediately stopped when GI >2% passengers or crew	
<input type="checkbox"/>	Immediate notifications to Health for GI>2% passengers or crew	

Section F: General

<input checked="" type="checkbox"/>	Discharge records review	Discharge records were reviewed (blackwater/graywater/residual solids) and are maintained properly. No discharges in MOU waters were present from the beginning of the 2008 cruise season to present.
<input checked="" type="checkbox"/>	Residual solids managed properly/ disposal protocol per MOU	Residual solids are discharged outside of MOU waters, outside of 12 nautical miles (at >6knots), and outside the Olympic Coast National Marine Sanctuary.
<input checked="" type="checkbox"/>	Hazardous Waste managed properly	Hazardous waste that is collected is being landed ashore in locations outside of Washington State.
<input checked="" type="checkbox"/>	WA Haz Waste guidelines followed (appendix vii)	Hazardous waste that is collected is being landed ashore in locations outside of Washington State.
<input checked="" type="checkbox"/>	Solid Waste managed properly	Solid waste appeared to be managed properly. The various solid waste streams are collected, sorted, stored, and sent ashore or incinerated as appropriate.
<input checked="" type="checkbox"/>	Oily bilge water managed properly	Oily bilge water is treated and discharged at less than 15 ppm (and typically less than 5 ppm) and at greater than 12 nautical miles.

Other:

Health = Washington State Department of Health

Section G: Sample Results

Parameter	Results
Biochemical Oxygen Demand 5-Day (BOD)	Not Applicable
Total Suspended Solids (TSS)	Not Applicable
Fecal Coliform	Not Applicable
Residual Chlorine	Not Applicable
pH	Not Applicable
Ammonia, Nitrogen	Not Applicable

Section H: Summary of Findings/Comments

Introduction

Amy Jankowiak, Washington State Department of Ecology (Ecology) Northwest Regional Office, Water Quality Program,

conducted the inspection of the Celebrity Cruises MILLENNIUM on October 1, 2008. The main contacts on board the MILLENNIUM included Ronald Raasch, Environmental Officer, and Dimitris Linas, AWP Project Engineer. Prior notification of the visit was given on September 26, 2008 for security protocol. The purpose of the inspection was to evaluate compliance with the *Memorandum of Understanding Cruise Operations in Washington State* (MOU), as amended. The MILLENNIUM has not requested and is not approved for discharge in Washington State.

The MILLENNIUM was placed into service in 2000, and is 964.6 feet long with a width of 105.6 feet.

Inspection

I arrived and boarded the ship (photo #01) at 10:05 am and began with introductions and a plan for the day. We then discussed discharge protocols for various waste streams. Discharge records were reviewed for black water and gray water discharges and showed no discharges in Washington waters from the beginning of the cruise season to date. Next, we headed down to the Hydroxyl system to view the components. We then looked at the garbage and recycling areas. We also reviewed the discharge location navigational maps for the shorter local cruises. I then concluded with a de-briefing and disembarked the vessel at about 11:50 am.

The MILLENNIUM made four port calls to Seattle, on May 8th, May 22nd, September 21st, and October 1st. The first couple of calls were on route to Alaska, and the last couple of calls were for shorter 3-4 day cruises between Canada and Washington. The rest of the season, the vessel's route is between Vancouver, B.C. and Alaska.

Discharge Protocols:

The MILLENNIUM has not requested, and is not approved to discharge in waters subject to the MOU. All black water and gray water is treated with an advanced wastewater treatment system (AWTS), Hydroxyl, and is discharged outside of MOU waters. At the end of the season, for the shorter, local cruises, the vessel is discharging all black water and gray water in pre-designated areas in Canadian waters near Victoria, Canada (photo #28) and at the north end of the Strait of Georgia in Canadian waters. All discharges are logged in the *Sewage and Graywater Discharge Record Book* based on the coordinates from the bridge. When a discharge is to occur, the bridge contacts the Engine Control Room and authorized staff allow the discharge and record the information. The discharge ports are padlocked.

Sewage residuals (sludge or biomass) are collected in the bio-residue tank and are held until discharged at greater than 12 nautical miles from shore, at greater than six knots, and outside of MOU waters and the Olympic Coast National Marine Sanctuary.

Most of the food waste is pulped (photo #24) and discharged outside of MOU waters and outside 12 nautical miles. The water from the pulper is recycled and occasionally drained to the gray water for treatment. The food waste disposal areas are monitored regularly by the Environmental Officer. The galley water goes to the gray water holding tanks. Some of the food waste such as bones, meat, and fruit with heavy skins cannot be pulped and are therefore incinerated. Cooking oil is collected to tanks and is off-loaded shore-side for disposal or recycling.

Pool and spa water is de-chlorinated and discharged outside of 12 nautical miles.

Oily bilge water is treated with the Turbulo system first and then a Marinfloc system second (oily water separators) to less than 5 ppm. There is a white box for the systems.

The vessel bunkers for potable water frequently in Alaska and produces the rest by desalinization with evaporators. A descaler is used for the evaporators.

Laundry water is sent to the gray water holding tanks along with shower and sink water from accommodations and throughout the vessel. Dry cleaning is done with a system using Perchloroethylene (PERC) which is collected and off-loaded as hazardous waste. The system does not use a lot of PERC and produces about one drum per six months.

Photo waste is treated to less than 5 ppm through silver recovery along with x-ray waste.

The drains from the medical facility go to the black water system. Sharps are collected in sharps containers, are then boxed and landed ashore as biohazard waste. Red bag waste from the medical facility is incinerated. Expired medications and narcotics are logged, and with witnesses incinerated outside of 12 nautical miles.

Fluorescent light bulbs are crushed with the bulb eater with mercury vapor removal (photo #25). Materials such as paint and thinners, batteries, fluorescent bulb waste, photo/x-ray waste, chemicals, aerosols and oily sludge are landed ashore outside of Washington State as hazardous waste. All hazardous waste records showed that all off-loads occurred outside of Washington State.

Materials such as aluminum (photo #26), tin, cardboard, paper, glass (photo #23), plastics, and scrap metal are recycled (photo #22). Dry garbage and recycling is off-loaded outside of Washington State, with the exception of one visit. Some papers, food-contaminated cardboard, some plastics, some biohazardous materials, and some food wastes are incinerated.

A copy of the most recent version of the MOU was not on-board or available. A link to the most recent version on Ecology's website was sent to the Environmental Officer following the inspection.

Black water and Gray water Systems:

Black water, which includes toilet waste and infirmity drains is collected in collection tanks. Gray water, which includes sink and shower water, along with laundry water and galley water, is sent to collection tanks. The black water and gray water collection then combines at the Advanced Wastewater Purification (AWP), Hydroxyl, system mixing tank (photo #02). Defoamer can be added to the mixing tank as needed (photo #04). From the mixing tank, the wastewater is screened with one of two primary screens (photo #10). The screens are cylinders of mesh filters. The solids are sent to the bio-residue tank (photo #05), while the liquid moves onto the bioreactors. There are three bioreactor stages (photo #03). Air is blown (photo #06) into the bioreactors and both air and levels are monitored with sensors (photo #07). The wastewater is then conveyed to the Dissolved Air Flotation (DAF) units (photos #11, #12, & #13). On the way to the DAFs, polymer is mixed in the line (photos #09 & #14). There are two DAFs. From the DAFs, liquid moves to the polishing filters (photo #16). The two polishing filters have two layers at 10 microns. Any solids collected from the filters or DAF are sent to the bio-residue tank. From the polishing filters, the liquid moves to ultraviolet (UV) light disinfection. There are four UV units (photo #17) of six bulbs each. Total suspended solids (TSS) are monitored both prior to UV (photo #19) and immediately after UV (photo #18). The TSS sensors have not been working properly. The manufacturer will be coming on board shortly to work on them. Effluent from the UV is also monitored for pH (photo #20). Fewer UV units are used when the effluent is going to the holding tank than when the effluent is being immediately discharged. The UV units are self-cleaning with an automatic wiper. There are six water holding tanks to hold the final effluent. The discharge port is padlocked (photo #21).

Samples were not taken, as the vessel does not discharge in MOU waters.

Conclusions and Recommendations

Mr. Raasch, the Environmental Officer, was very knowledgeable of the environmental systems and protocols.

Mr. Linas, the AWP Project Engineer, was very knowledgeable of the AWP Hydroxyl system.

The pre-planning accounting for the vessels itinerary, route, and holding tank capacity is a good way to assure that all discharges would take place in accordance with regulations and the MOU.

Each vessel that calls to a port in Washington should have a copy of the current MOU available. A copy was not available during the inspection.

Attachments:
Photographs

Copies to:
Rich Pruiitt, RCCL
Ronald Raasch, MILLENNIUM EO
Amy Jankowiak, Ecology
Kevin Fitzpatrick, Ecology
Mark Toy, Dept. of Health
Central Files: Celebrity Cruises – MILLENNIUM; WQ 6.1

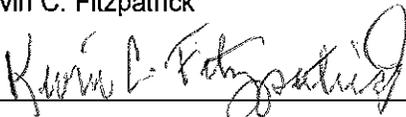
Section I: Signatures		
<u>Name and Signature of Inspector</u> Amy Jankowiak 	<u>Agency/Office/Telephone</u> Department of Ecology/Northwest Regional Office/Water Quality Program/Municipal Compliance Specialist/(425) 649-7195	<u>Date</u> 10/16/08
<u>Name and Signature of Reviewer</u> Kevin C. Fitzpatrick 	<u>Agency/Office/Telephone</u> Department of Ecology/Northwest Regional Office/Water Quality Section Manager/(425) 649-7033	<u>Date</u> 10/16/08



PHOTO #:01 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010042
DESCRIPTION: MILLENNIUM VESSEL, SEATTLE

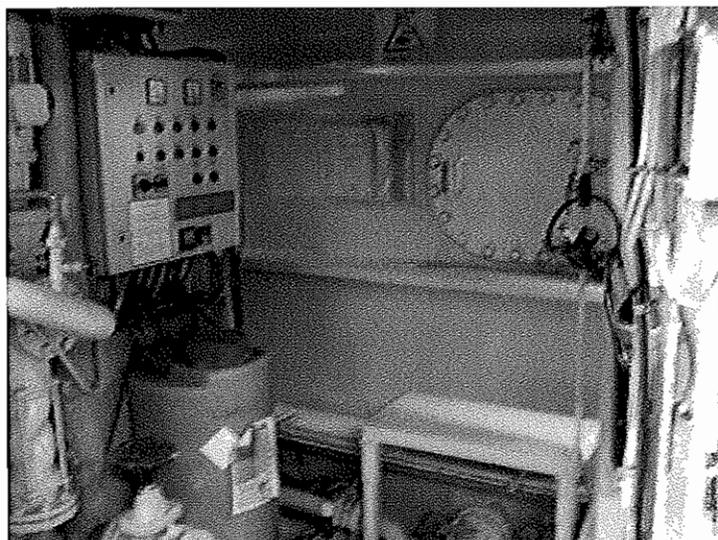


PHOTO #:02 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010012
DESCRIPTION: BLACK WATER AND GRAY WATER MIXING TANK



PHOTO #:03 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010014
DESCRIPTION: HYDROXYL BIOREACTORS

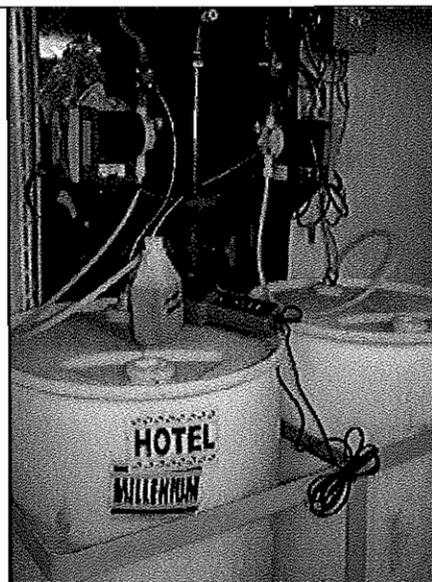


PHOTO #:04 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010016
DESCRIPTION: MIXING TANK DEFOAMER



PHOTO #:05 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010017
DESCRIPTION: BIO-RESIDUE TANK (FOR RESIDUAL
SOLIDS/BIOMASS)



PHOTO #:06 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010018
DESCRIPTION: BLOWERS FOR BIOREACTORS

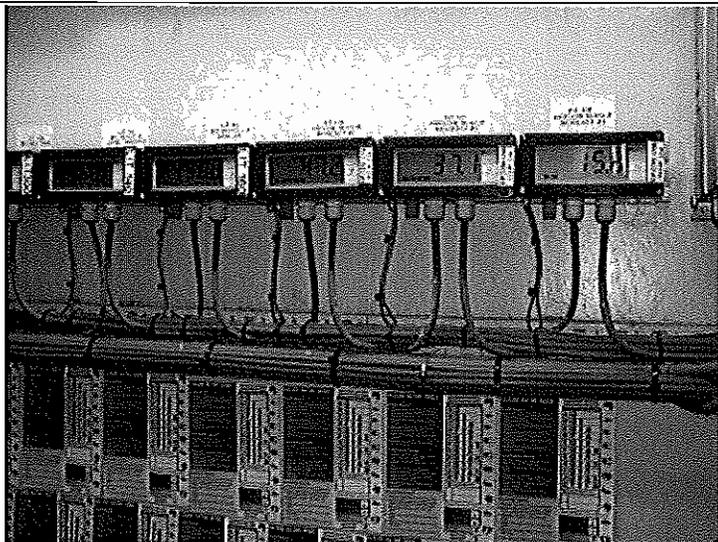


PHOTO #:07 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010019
DESCRIPTION: AIR FLOW AND LEVEL SENSORS FOR
BIOREACTORS

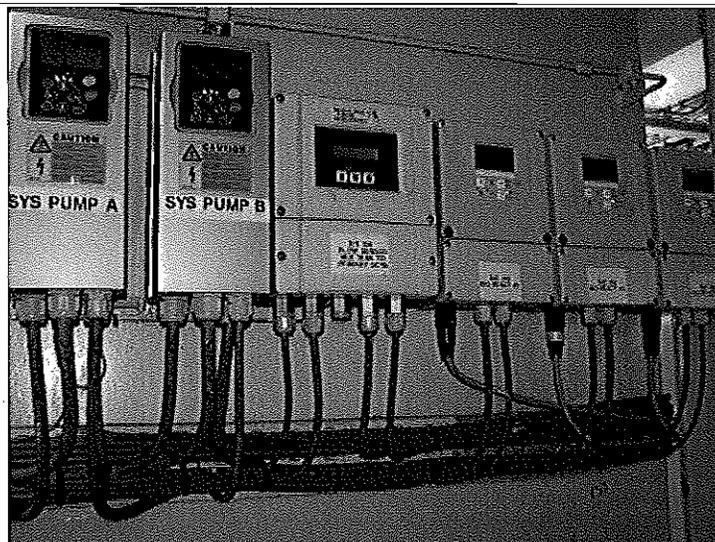


PHOTO #:08 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010020
DESCRIPTION: PUMP SENSORS FOR BIOREACTORS

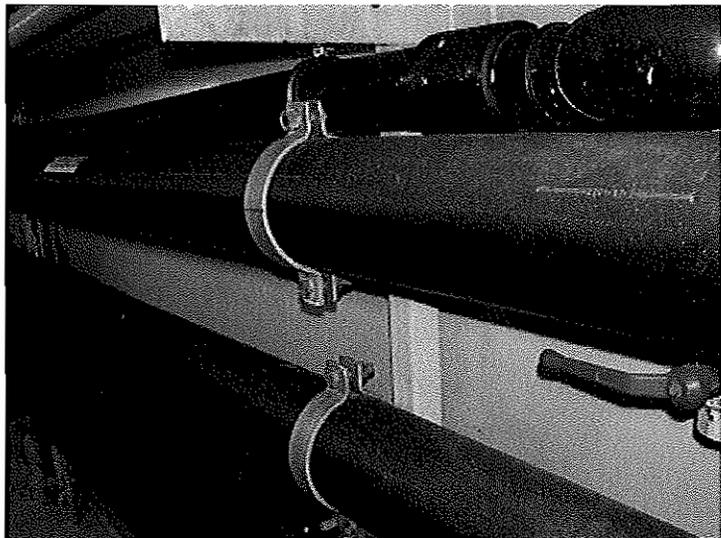


PHOTO #:09 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010021
DESCRIPTION: POLYMER MIXING (PRE-DAF)



PHOTO #:10 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010022
DESCRIPTION: PRIMARY SCREENS (1 OF 2)

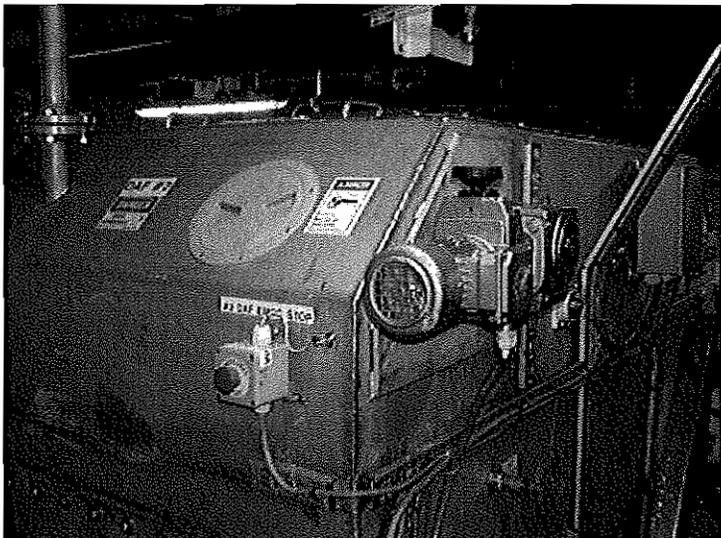


PHOTO #:11 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010023
DESCRIPTION: DISSOLVED AIR FLOTATION (DAF) (1 OF 2)

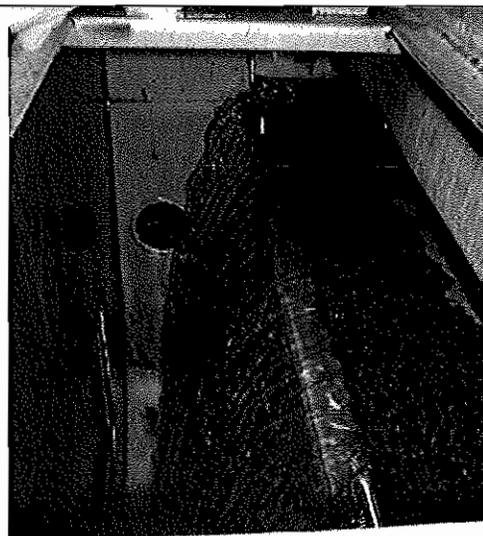


PHOTO #:12 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010024
DESCRIPTION: INSIDE OF DAF

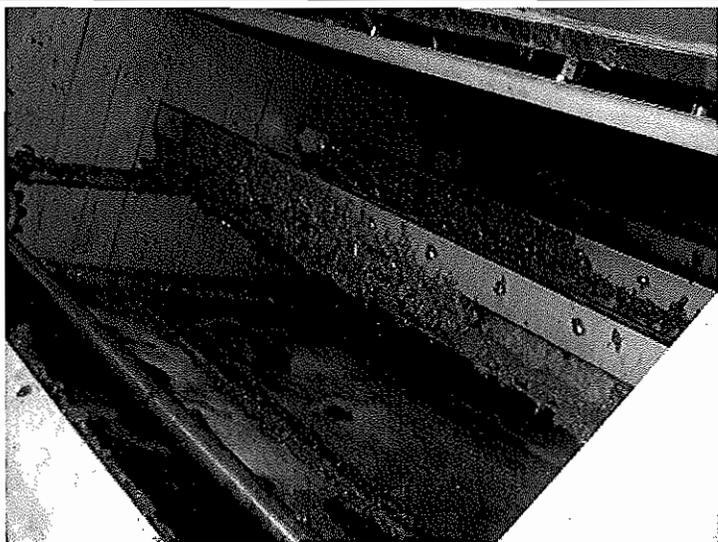


PHOTO #:13 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010025
DESCRIPTION: INSIDE OF DAF

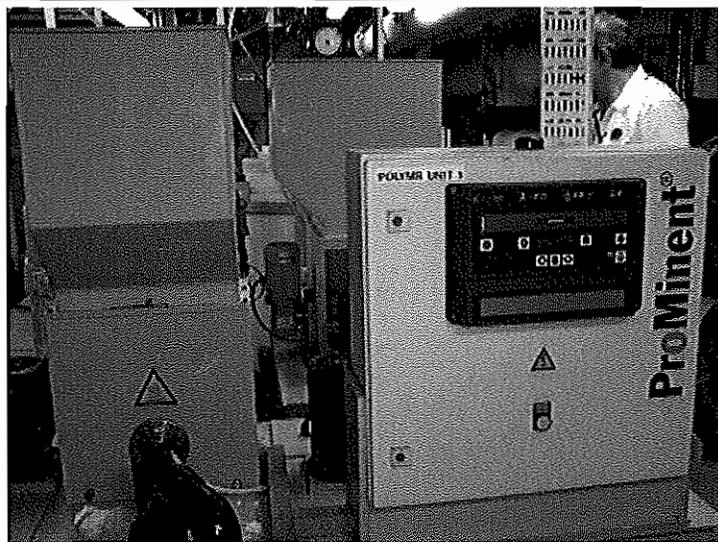


PHOTO #:14 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010026
DESCRIPTION: POLYMER UNITS



PHOTO #:15 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010027
DESCRIPTION: SYSTEM OVERVIEW/ACCESS ON SYSTEM LEVEL

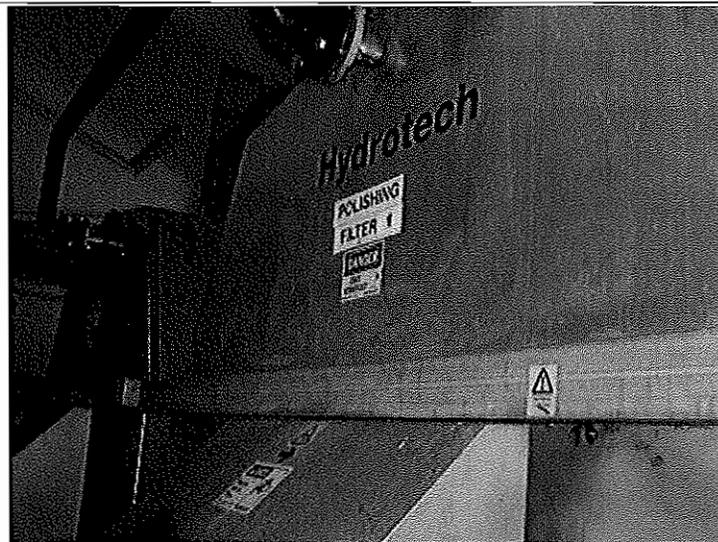


PHOTO #:16 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010028
DESCRIPTION: POLISHING FILTERS

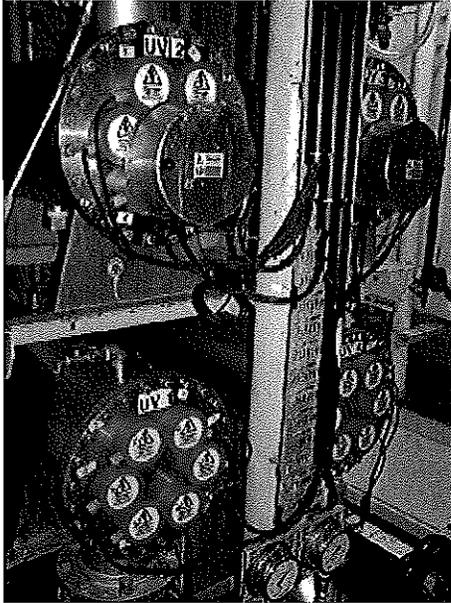


PHOTO #:17 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010029
DESCRIPTION: ULTRAVIOLET DISINFECTION SYSTEM

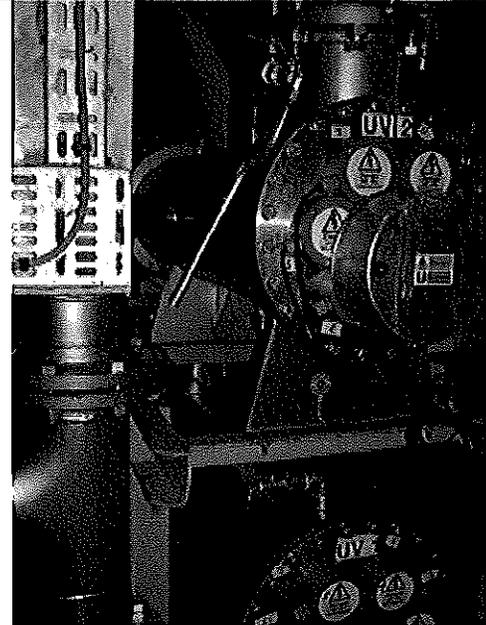


PHOTO #:18 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010030
DESCRIPTION: UV DISINFECTION SYSTEM WITH SAMPLE PORT
AND TSS MONITOR UNIT

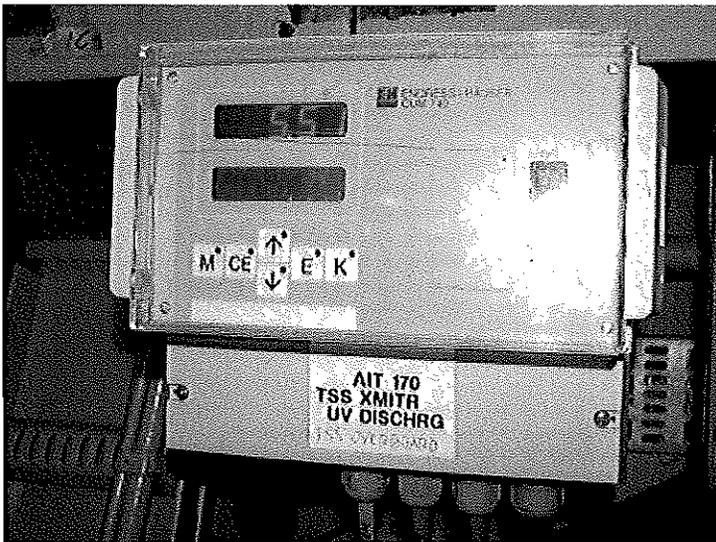


PHOTO #:19 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010031
DESCRIPTION: TSS SENSOR PANEL (PRE UV)

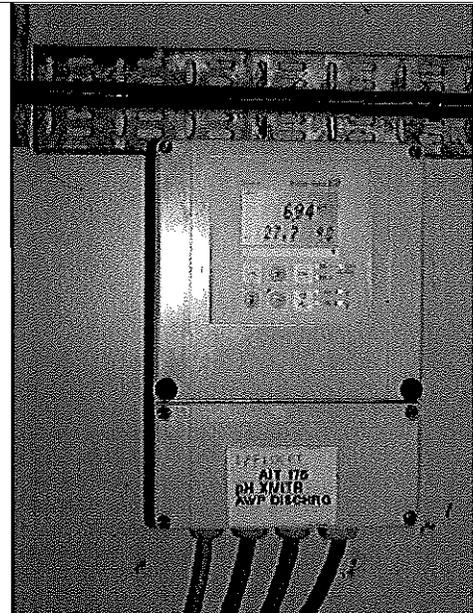


PHOTO #:20 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010032
DESCRIPTION: PH SENSOR FINAL EFFLUENT



PHOTO #:21 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010033
DESCRIPTION: DISCHARGE PORT FOR HYDROXYL EFFLUENT



PHOTO #:22 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010034
DESCRIPTION: GARBAGE/RECYCLING SORTING AREA

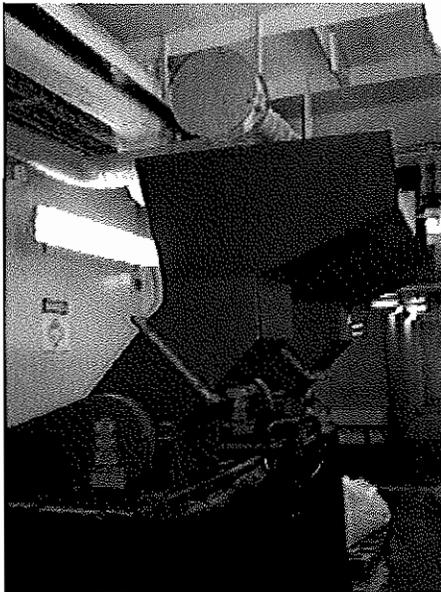


PHOTO #:23 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010036
DESCRIPTION: GLASS CRUSHERS



PHOTO #:24 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010037
DESCRIPTION: FOOD WASTE EXTRACTOR



PHOTO #:25 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010038
DESCRIPTION: FLORESCENT BULB CRUSHER/MERCURY
REMOVAL SYSTEM

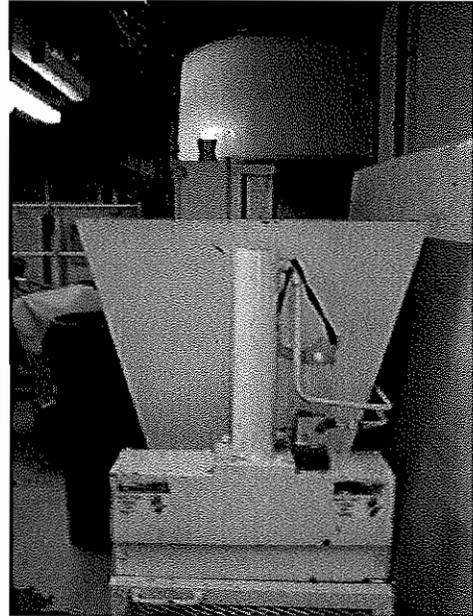


PHOTO #:26 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010039
DESCRIPTION: CAN CRUSHER



PHOTO #:27 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010040
DESCRIPTION: COLD STORAGE



PHOTO #:28 DATE: OCTOBER 1, 2008
TAKEN BY: AMY JANKOWIAK FILE No.: PA010041
DESCRIPTION: CANADA DISCHARGE EXEMPTION AREA

